



STIC Search Report

Biotech-Chem Library

STIC Database Tracking Number: 103732

TO: Rita Mitra
Location: CM-1/9B03/9B01
Art Unit: 1653
Sunday, September 21, 2003

Case Serial Number: 09/737297

197

From: Toby Port
Location: Biotech-Chem Library
CM1-6A04
Phone: 308-3534

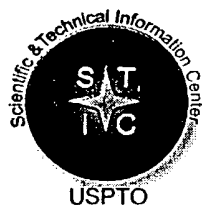
toby.port@uspto.gov

Search Notes

Dear Examiner Mitra,

Here are the results of your search.
Please feel free to contact me if you have any questions.

Toby Port



STIC SEARCH RESULTS FEEDBACK FORM

Biotech-Chem Library

Questions about the scope or the results of the search? Contact *the searcher or contact*:

Mary Hale, Information Branch Supervisor
308-4258, CM1-1E01

Voluntary Results Feedback Form

➤ I am an examiner in Workgroup: Example: 1610

➤ Relevant prior art **found**, search results used as follows:

- ☐ 102 rejection
- ☐ 103 rejection
- ☐ Cited as being of interest.
- ☐ Helped examiner better understand the invention.
- ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature
(journal articles, conference proceedings, new product announcements etc.)

➤ Relevant prior art **not found**:

- ☐ Results verified the lack of relevant prior art (helped determine patentability).
- ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to STIC/Biotech-Chem Library CM1 – Circ. Desk



=> file caplus; d que 17; d que 111; d que 113
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FILE COVERS 1907 - 21 Sep 2003 VOL 139 ISS 13
FILE LAST UPDATED: 19 Sep 2003 (20030919/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

| | | | | |
|----|------|-----------------------------|--------|-----------------------------|
| L2 | 738 | SEA FILE=CAPLUS ABB=ON | PLU=ON | (ANTI FREEZE OR ANTIFREEZE) |
| | | (2A) PROTEIN | | |
| L5 | 6731 | SEA FILE=CAPLUS ABB=ON | PLU=ON | FROZEN FOODS/CT OR FROZEN |
| | | DESSERTS/CT OR ICE CREAM/CT | | |
| L7 | 17 | SEA FILE=CAPLUS ABB=ON | PLU=ON | L2 AND L5 |

| | | | | |
|-----|-------|-----------------------------|--------|-----------------------------|
| L2 | 738 | SEA FILE=CAPLUS ABB=ON | PLU=ON | (ANTI FREEZE OR ANTIFREEZE) |
| | | (2A) PROTEIN | | |
| L3 | 29 | SEA FILE=CAPLUS ABB=ON | PLU=ON | MARINOMONAS/CW |
| L4 | 47103 | SEA FILE=CAPLUS ABB=ON | PLU=ON | PSEUDOMONAS/CW |
| L5 | 6731 | SEA FILE=CAPLUS ABB=ON | PLU=ON | FROZEN FOODS/CT OR FROZEN |
| | | DESSERTS/CT OR ICE CREAM/CT | | |
| L7 | 17 | SEA FILE=CAPLUS ABB=ON | PLU=ON | L2 AND L5 |
| L8 | 29 | SEA FILE=CAPLUS ABB=ON | PLU=ON | L5 AND (L3 OR L4) |
| L9 | 28 | SEA FILE=CAPLUS ABB=ON | PLU=ON | L8 NOT L7 |
| L11 | 3 | SEA FILE=CAPLUS ABB=ON | PLU=ON | ICE NUCLEAT?/TI AND L9 |

| | | | | |
|-----|-------|------------------------|--------|-----------------------------|
| L2 | 738 | SEA FILE=CAPLUS ABB=ON | PLU=ON | (ANTI FREEZE OR ANTIFREEZE) |
| | | (2A) PROTEIN | | |
| L3 | 29 | SEA FILE=CAPLUS ABB=ON | PLU=ON | MARINOMONAS/CW |
| L4 | 47103 | SEA FILE=CAPLUS ABB=ON | PLU=ON | PSEUDOMONAS/CW |
| L6 | 12785 | SEA FILE=CAPLUS ABB=ON | PLU=ON | FREEZING/CT |
| L13 | 2 | SEA FILE=CAPLUS ABB=ON | PLU=ON | L6 AND L2 AND (L3 OR L4) |

=> s 17 or 111 or 113
L44 22 L7 OR L11 OR L13

=> file biosis; d que 124
FILE 'BIOSIS' ENTERED AT 15:47:02 ON 21 SEP 2003
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FILE COVERS 1969 TO DATE.
CAS REGISTRY NUMBERS AND CHEMICAL NAMES (CNS) PRESENT
FROM JANUARY 1969 TO DATE.

RECORDS LAST ADDED: 17 September 2003 (20030917/ED)

L14 664 SEA FILE=BIOSIS ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE)
(2A) PROTEIN
L21 2105 SEA FILE=BIOSIS ABB=ON PLU=ON ICE (W) (CREAM OR NUCLEAT?)
L22 44 SEA FILE=BIOSIS ABB=ON PLU=ON L14 AND L21
L23 8 SEA FILE=BIOSIS ABB=ON PLU=ON L22 AND (FOOD? OR GLYCOPROT?
OR BARLEY OR PSEUDOMONAS OR PRESERV?)/TI
L24 6 SEA FILE=BIOSIS ABB=ON PLU=ON L23 NOT (HELICAL OR COLLEMBOLAN
)/TI

=> file biotechno; d que l28; d que l29; d que l31
FILE 'BIOTECHNO' ENTERED AT 15:47:26 ON 21 SEP 2003
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FILE LAST UPDATED: 16 SEP 2003 <20030916/UP>
FILE COVERS 1980 TO DATE.

>>> SIMULTANEOUS LEFT AND RIGHT TRUNCATION AVAILABLE IN
/CT AND BASIC INDEX <<<

L25 197 SEA FILE=BIOTECHNO ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE)
(2A) PROTEIN
L27 101 SEA FILE=BIOTECHNO ABB=ON PLU=ON ICE CREAM OR FROZEN DESSERT
L28 0 SEA FILE=BIOTECHNO ABB=ON PLU=ON L25 AND L27

L25 197 SEA FILE=BIOTECHNO ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE)
(2A) PROTEIN
L26 200 SEA FILE=BIOTECHNO ABB=ON PLU=ON (FROZEN OR FREEZ?) (2A)
(FOOD OR VEGETABLE)
L29 1 SEA FILE=BIOTECHNO ABB=ON PLU=ON L25 AND L26

L25 197 SEA FILE=BIOTECHNO ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE)
(2A) PROTEIN
L30 25 SEA FILE=BIOTECHNO ABB=ON PLU=ON PEUDOMONAS OR MARINOMONAS
L31 0 SEA FILE=BIOTECHNO ABB=ON PLU=ON L25 AND L30

=> file jicst-eplus; d que l36; d que l37; d que l38
FILE 'JICST-EPLUS' ENTERED AT 15:47:45 ON 21 SEP 2003
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FILE COVERS 1985 TO 15 SEP 2003 (20030915/ED)

THE JICST-EPLUS FILE HAS BEEN RELOADED TO REFLECT THE 1999 CONTROLLED
TERM (/CT) THESAURUS RELOAD.

L32 34 SEA FILE=JICST-EPLUS ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE
) (2A) PROTEIN
 L33 2009 SEA FILE=JICST-EPLUS ABB=ON PLU=ON (FROZEN OR FREEZ?) (2A)
 (FOOD OR VEGETABLE OR DESSERT)
 L36 1 SEA FILE=JICST-EPLUS ABB=ON PLU=ON L32 AND L33

L32 34 SEA FILE=JICST-EPLUS ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE
) (2A) PROTEIN
 L34 333 SEA FILE=JICST-EPLUS ABB=ON PLU=ON ICE CREAM
 L37 0 SEA FILE=JICST-EPLUS ABB=ON PLU=ON L32 AND L34

L32 34 SEA FILE=JICST-EPLUS ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE
) (2A) PROTEIN
 L35 8 SEA FILE=JICST-EPLUS ABB=ON PLU=ON PEUDOMONAS OR MARINOMONAS
 L38 0 SEA FILE=JICST-EPLUS ABB=ON PLU=ON L32 AND L35

=> file wpids; d que 142; d que 143
 FILE 'WPIDS' ENTERED AT 15:47:57 ON 21 SEP 2003
 COPYRIGHT (C) 2003 THOMSON DERWENT

FILE LAST UPDATED: 19 SEP 2003 <20030919/UP>
 MOST RECENT DERWENT UPDATE: 200360 <200360/DW>
 DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

>>> NEW WEEKLY SDI FREQUENCY AVAILABLE --> see NEWS <<<

>>> PATENT IMAGES AVAILABLE FOR PRINT AND DISPLAY <<<

>>> FOR A COPY OF THE DERWENT WORLD PATENTS INDEX STN USER GUIDE,
 PLEASE VISIT:
http://www.stn-international.de/training_center/patents/stn_guide.pdf <<<

L39 48 SEA FILE=WPIDS ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE)
 (2A) PROTEIN
 L40 10788 SEA FILE=WPIDS ABB=ON PLU=ON (FROZEN OR FREEZ?) (2A) (FOOD
 OR VEGETABLE OR DESSERT) OR ICE CREAM
 L42 20 SEA FILE=WPIDS ABB=ON PLU=ON L39 AND L40

L39 48 SEA FILE=WPIDS ABB=ON PLU=ON (ANTI FREEZE OR ANTIFREEZE)
 (2A) PROTEIN
 L41 8194 SEA FILE=WPIDS ABB=ON PLU=ON PSEUDOMONAS OR MARINOMONAS
 L43 1 SEA FILE=WPIDS ABB=ON PLU=ON L39 AND L41

=> s 142 or 143
 L45 20 L42 OR L43

=> dup rem 144 124 129 136 145
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PROCESSING COMPLETED FOR L44

PROCESSING COMPLETED FOR L24

PROCESSING COMPLETED FOR L29

PROCESSING COMPLETED FOR L36

PROCESSING COMPLETED FOR L45

L46 40 DUP REM L44 L24 L29 L36 L45 (10 DUPLICATES REMOVED)

ANSWERS '1-22' FROM FILE CAPLUS

ANSWERS '23-27' FROM FILE BIOSIS

ANSWER '28' FROM FILE BIOTECHNO

ANSWER '29' FROM FILE JICST-EPLUS

ANSWERS '30-40' FROM FILE WPIDS

=> d ibib ab l46 1-40

L46 ANSWER 1 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 1

ACCESSION NUMBER: 2003:532465 CAPLUS

DOCUMENT NUMBER: 139:84379

TITLE: **Antifreeze protein** additives for
vegetables

INVENTOR(S): Ralfs, Julie Debra; Sidebottom, Christopher Michael;
Ormerod, Andrew Paul

PATENT ASSIGNEE(S): Unilever PLC, UK; Unilever NV; Hindustan Lever Limited

SOURCE: PCT Int. Appl., 17 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---------------|--|----------|-----------------|----------|
| WO 2003055320 | A1 | 20030710 | WO 2002-EP13949 | 20021210 |
| W: | AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY | | | |
| RW: | GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG | | | |

PRIORITY APPLN. INFO.: EP 2002-250048 A 20020104

AB The invention relates to improving the properties of frozen vegetables when thawed for consumption, more particularly the invention provides a process for prepg. vegetables wherein said process comprises the steps

of:(i) blanching a vegetable or part thereof;(ii) infiltrating an
antifreeze protein soln.:(iii) freezing.

REFERENCE COUNT: 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS
 RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 2 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 2
 ACCESSION NUMBER: 2003:417776 CAPLUS
 DOCUMENT NUMBER: 139:3232
 TITLE: Purification of fish **antifreeze**
proteins for use in frozen food products
 INVENTOR(S): Tsuda, Sakae; Miura, Ai
 PATENT ASSIGNEE(S): National Institute of Advanced Industrial Science and
 Technology, Japan
 SOURCE: PCT Int. Appl., 56 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|------|----------|-----------------|------------|
| WO 2003044052 | A1 | 20030530 | WO 2002-JP12153 | 20021121 |
| W: US | | | | |
| RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR | | | | |
| PRIORITY APPLN. INFO.: | | | | |
| | | | JP 2001-356709 | A 20011121 |
| | | | JP 2002-104477 | A 20020405 |
| | | | JP 2002-192339 | A 20020701 |
| | | | JP 2002-320425 | A 20021101 |

AB It is intended to promote the utilization of **antifreeze**
proteins by obtaining **antifreeze proteins** from
 fishes inhabiting Japanese waters or water areas of the same climate, in
 particular, fishes selected from among those belonging to the genera
 Myoxocephalus, Gymnocanthus, Hemilepidotus, Furcina, Hypomesus,
 Spirinchus, Mallotus, Pleurogrammus, Sebastes, Clupea, Limanda, Liopsetta,
 Clidoderma, Cleisthenes, Microstomus, Lepidopsetta, Platichthys, Kareius,
 Eopsetta, Gadus, Theragra, Ammodytes, Hypoptychus, Trachurus, Brachyopsis,
 Pholis, Opisthognathus, Zoarces, Ascoldia, Pholidapus and Etrumeus.

REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS
 RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 3 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 3
 ACCESSION NUMBER: 2001:904220 CAPLUS
 DOCUMENT NUMBER: 136:49386
 TITLE: Cloning of Tenebrio molitor **antifreeze**
protein cDNAs, their properties and
 recombinant expression, and application as recrystn.
 inhibition factors thereof
 INVENTOR(S): Horwath, Kathleen L.; Myers, Kevin L.; Easton,
 Christopher M.
 PATENT ASSIGNEE(S): The Research Foundation of State University of New
 York, USA
 SOURCE: PCT Int. Appl., 363 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------|------|------|-----------------|------|
|------------|------|------|-----------------|------|

WO 2001094378 A1 20011213 WO 2001-US18532 20010607
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU,
CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL,
IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,
MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI,
SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ,
BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,
DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF,
BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG
US 2002172951 A1 20021121 US 2001-876348 20010607
US 2002173024 A1 20021121 US 2001-876796 20010607
PRIORITY APPLN. INFO.: US 2000-210446P P 20000608
AB The invention provides protein and cDNA sequences for thermal hysteresis
proteins (THPs) or **antifreeze proteins** (AFPs)
derived from *Tenebrio molitor*, members of *Tenebrionoidea* Type AFP Tm12.86
multigene family which lower the f.p. of a soln. without effecting the
m.p. These proteins include Tm12.86, Tm2.2, Tm3.4, Tm3.9, Tm7.5, Tm2.3,
Tm12.84 and distantly related Tm13.17 (closely related to B1 assessor
gland protein of *T. molitor*). The invention also discloses essential
biochem. and cellular tools that make possible more direct cellular
investigations, and an assessment of the relation between thermal
hysteresis protein (THP) levels and antifreeze activity (both thermal
hysteresis and recrystn. inhibition [RI]). Related methods for prep.
recombinant said proteins and for providing antifreeze or recrystn.
inhibition properties to a subject formulation. The purified, expressed
THP protein can be directly added to an aq. soln. to depress the f.p., or
transformed organisms expressing THP can be added to items which will be
stored frozen. Also provided is a recrystn. inhibition method for detg.
the presence, relative concn., and/or activity of thermal hysteresis
proteins comprising: providing a proteinaceous compn. in a solvent to form
a test soln.; flash freezing said soln.; raising the temp. of the frozen
soln. to an appropriate annealing temp. that allows for a partial melt,
while limiting heterogeneity in ice grain sizes within said soln.;
maintaining said frozen soln. at the annealing temp. for a length of time
sufficient to allow for recrystn.; monitoring the ice crystal grain size
changes over time; and detg. the presence of functional thermal hysteresis
proteins in said soln. given the retention of significantly smaller ice
crystal grain sizes relative to at least one control soln. These THP can
be used for new techniques and compns. suitable for improving the
preservation characteristics of org. materials at low temps., including
storage of frozen foods, plasma, cells, plants, etc.
REFERENCE COUNT: 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT
L46 ANSWER 4 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 4
ACCESSION NUMBER: 2001:816714 CAPLUS
DOCUMENT NUMBER: 135:357072
TITLE: **Anti-freeze proteins,**
their production and use
INVENTOR(S): Berry, Mark John; Doucet, Charlotte Juliette;
Lundheim, Rolv Sigmund; Sevilla, Marie-Pierre;
Whiteman, Sally-anne
PATENT ASSIGNEE(S): Unilever Plc, UK; Unilever Nv; Hindustan Lever Limited
SOURCE: PCT Int. Appl., 42 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------------------|--|----------|-----------------|------------|
| WO 2001083534 | A1 | 20011108 | WO 2001-EP3927 | 20010406 |
| W: | AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | |
| RW: | GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | |
| EP 1276763 | A1 | 20030122 | EP 2001-919437 | 20010406 |
| R: | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR | | | |
| BR 2001010394 | A | 20030204 | BR 2001-10394 | 20010406 |
| PRIORITY APPLN. INFO.: | | | GB 2000-10314 | A 20000427 |
| | | | WO 2001-EP3927 | W 20010406 |

AB **Antifreeze proteins** which can be derived from the lichen *Nephroma arcticum* and **proteins** having **antifreeze** activity having an amino acid sequence part of which shows at least 80 overlap with the amino acid sequence L-V-I-G-S-T-A-Q(E)-N-F-G-V-V(S)-A-A-A-T. Methods for their prepn., their use in food processing and food compns. comprising them are also described.

REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 5 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 5
 ACCESSION NUMBER: 2001:453093 CAPLUS
 DOCUMENT NUMBER: 135:75838
 TITLE: Processes and organisms for the production of **anti-freeze proteins**
 INVENTOR(S): Berry, Mark John; Griffiths, Allen; Hill, Philip John; Laybourne-Parry, Johanna; Mills, Sarah Victoria
 PATENT ASSIGNEE(S): Unilever PLC, UK; Unilever NV; Hindustan Lever Limited
 SOURCE: PCT Int. Appl., 58 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---------------|--|----------|-----------------|----------|
| WO 2001044275 | A2 | 20010621 | WO 2000-EP12396 | 20001205 |
| WO 2001044275 | A3 | 20020321 | | |
| W: | AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | |
| RW: | GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | |
| EP 1240188 | A2 | 20020918 | EP 2000-989964 | 20001205 |
| R: | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR | | | |
| BR 2000016475 | A | 20021112 | BR 2000-16475 | 20001205 |
| US 2002072108 | A1 | 20020613 | US 2000-737297 | 20001215 |

PRIORITY APPLN. INFO.:

GB 1999-29696 A 19991215
WO 2000-EP12396 W 20001205

AB The invention relates to a process for prepg. a novel anti-freeze peptide and to the peptides obtained from bacteria from an aq. low-temp. environment, such as *Marinomonas protea* and a novel *Pseudomonas* species. These anti-freeze peptides can suitably be incorporated in frozen food products such as frozen vegetables and frozen confectionery such as ice cream.

L46 ANSWER 6 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 6

ACCESSION NUMBER: 2001:845808 CAPLUS

DOCUMENT NUMBER: 136:66701

TITLE: Relationship between **antifreeze protein** and freezing resistance in *Pseudomonas putida* GR12-2

AUTHOR(S): Kawahara, Hidehisa; Li, Jiping; Griffith, Marilyn; Glick, Bernard R.

CORPORATE SOURCE: Department of Biotechnology, Kansai University, Suita, 564-8680, Japan

SOURCE: Current Microbiology (2001), 43(5), 365-370
CODEN: CUMIDD; ISSN: 0343-8651

PUBLISHER: Springer-Verlag New York Inc.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Following transposon Tn5 mutagenesis of the plant growth-promoting rhizobacterium *Pseudomonas putida* GR12-2, mutants that have different freeze-resistant properties were selected. Five of the freeze-sensitive mutants, i.e. FSM-5, -6, -14, -29, and -41, secreted a lower amt. of **antifreeze protein** (AFP) into the culture broth compared with the wild-type. Among of these five mutants, the three mutants (FSM-6, FSM-14, and FSM-41) that have the lowest level of freezing resistance (4.0-6.0% survival) also produce AFP at low levels (0.5-0.9 .mu.g/mL) compared with the wild-type (4.8 .mu.g/mL). The antifreeze and ice-nucleating activities of the AFP from these three mutant strains were similar to those of wild-type. Furthermore, the decreased freezing resistance from three mutants could be partially restored by adding purified AFP to mutant cell suspensions. Freezing resistance of three mutants was found to increase in proportion to the addn. of AFP up to a concn. of 50 .mu.g/mL. We conclude that accumulation of AFP is one component of the mechanism for freezing resistance in bacteria.

REFERENCE COUNT: 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 7 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 7

ACCESSION NUMBER: 1999:487398 CAPLUS

DOCUMENT NUMBER: 131:112410

TITLE: Protein and cDNA sequences of an **antifreeze protein** isolated from *Lolium perenne*, and itsINVENTOR(S): use in improving the freezing tolerance of foodstuffs
Jarman, Carl Dudley; Sidebottom, Christopher Michael; Twigg, Sarah; Worrall, Dawn

PATENT ASSIGNEE(S): Unilever N.V., Neth.; Unilever PLC

SOURCE: PCT Int. Appl., 39 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------|------|-------|-----------------|-------|
| ----- | --- | ----- | ----- | ----- |

WO 9937782 A2 19990729 WO 1998-EP8553 19981223
WO 9937782 A3 19990916
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE,
DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP,
KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN,
MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU,
TJ, TM
RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES,
FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI,
CM, GA, GN, GW, ML, MR, NE, SN, TD, TG
CA 2319118 AA 19990729 CA 1998-2319118 19981223
AU 9924188 A1 19990809 AU 1999-24188 19981223
AU 747087 B2 20020509
BR 9814776 A 20001024 BR 1998-14776 19981223
EP 1049783 A2 20001108 EP 1998-966702 19981223
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
IE, FI
JP 2002504316 T2 20020212 JP 2000-528689 19981223
PRIORITY APPLN. INFO.: GB 1998-1408 A 19980122
WO 1998-EP8553 W 19981223
AB The invention relates to **antifreeze proteins** (AFPs)
and their use for improving the freezing tolerance of foodstuffs. The
invention describes a method of isolating AFPs from natural sources, such
as cold-acclimatized grass, and their incorporation into a mix for the
prepn. of frozen products before the pasteurization process. The
invention provides protein and cDNA sequences of an AFP isolated from
Lolium Perenne using said method. The preferred products wherein the AFPs
are used are frozen confectionery products, such as ice cream. Addnl.,
the invention relates to the use of the AFP to produce plants having
increased frost tolerance.
L46 ANSWER 8 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 8
ACCESSION NUMBER: 1999:487318 CAPLUS
DOCUMENT NUMBER: 131:115671
TITLE: Lichen **antifreeze protein** for use
in frozen food
INVENTOR(S): Sidebottom, Christopher Michael; Smallwood, Margaret
Felicia; Byass, Louise Jane
PATENT ASSIGNEE(S): Unilever N. V., Neth.; Unilever PLC
SOURCE: PCT Int. Appl., 20 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------|--|----------|-----------------|----------|
| WO 9937673 | A2 | 19990729 | WO 1998-EP8554 | 19981223 |
| WO 9937673 | A3 | 19990916 | | |
| W: | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | |
| RW: | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | |
| CA 2318869 | AA | 19990729 | CA 1998-2318869 | 19981223 |

AU 9926148 A1 19990809 AU 1999-26148 19981223
 AU 753334 B2 20021017
 BR 9814760 A 20001017 BR 1998-14760 19981223
 EP 1049713 A2 20001108 EP 1998-966922 19981223
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
 IE, FI
 JP 2002508303 T2 20020319 JP 2000-528594 19981223
 PRIORITY APPLN. INFO.: GB 1998-1420 A 19980122
 WO 1998-EP8554 W 19981223

AB An **antifreeze protein** from lichen (e.g., Umbilicaria antarctica) with an apparent mol. wt. of 20-28 kDa and with an N-terminal amino acid sequence which shows at least 80% overlap with A-P-A-V-V-M-G-D-A-E-S-F-G-A-I-A-H-G-G-L, and modified versions and isoforms of this protein, may be used in frozen foods such as ice cream to prevent ice crystal formation.

L46 ANSWER 9 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 9
 ACCESSION NUMBER: 1998:635626 CAPLUS
 DOCUMENT NUMBER: 129:244396
 TITLE: Frozen food product
 INVENTOR(S): Smallwood, Keith
 PATENT ASSIGNEE(S): Unilever N.V., Neth.; Unilever PLC
 SOURCE: PCT Int. Appl., 20 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 5
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------------------|------|--|------------------|----------|
| WO 9841107 | A1 | 19980924 | WO 1998-EP1576 | 19980312 |
| W: | | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | |
| RW: | | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | | |
| ZA 9706472 | A | 19990122 | ZA 1997-6472 | 19970722 |
| AU 9872079 | A1 | 19981012 | AU 1998-72079 | 19980312 |
| ZA 9802151 | A | 19990913 | ZA 1998-2151 | 19980313 |
| PRIORITY APPLN. INFO.: | | | EP 1996-305499 A | 19960726 |
| | | | EP 1997-301719 A | 19970314 |
| | | | WO 1998-EP1576 W | 19980312 |

AB Disclosed is the use of storage temps. of from -2 .degree.C to -12 .degree.C for frozen food products contg. **anti-freeze proteins**.

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 10 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 10
 ACCESSION NUMBER: 1997:119158 CAPLUS
 DOCUMENT NUMBER: 126:130754
 TITLE: Method of making frozen compositions
 INVENTOR(S): Clemmings, John F.; Zoerb, Hans F.; Rosenwald, Diane R.; Huang, Victor T.
 PATENT ASSIGNEE(S): Pillsbury Co., USA
 SOURCE: PCT Int. Appl., 20 pp.
 CODEN: PIXXD2

DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|--|------|----------|-----------------|------------|
| WO 9639878 | A1 | 19961219 | WO 1996-US6519 | 19960520 |
| W: AU, BR, CA, CN, JP, MX | | | | |
| RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE | | | | |
| CA 2195950 | AA | 19961219 | CA 1996-2195950 | 19960520 |
| CA 2195950 | C | 20011211 | | |
| AU 9657904 | A1 | 19961230 | AU 1996-57904 | 19960520 |
| AU 704570 | B2 | 19990429 | | |
| EP 783254 | A1 | 19970716 | EP 1996-914594 | 19960520 |
| EP 783254 | B1 | 20010829 | | |
| R: DE, ES, FR, GB, IT | | | | |
| CN 1155831 | A | 19970730 | CN 1996-190624 | 19960520 |
| CN 1078454 | B | 20020130 | | |
| JP 10508759 | T2 | 19980902 | JP 1996-500532 | 19960520 |
| ES 2163627 | T3 | 20020201 | ES 1996-914594 | 19960520 |
| PRIORITY APPLN. INFO.: | | | US 1995-472500 | A 19950607 |
| | | | WO 1996-US6519 | W 19960520 |

AB The present invention includes a method for making a frozen compn. for storage. The method does not require a hardening step prior to storage. The method includes prep. a mixt. of ingredients that include water and adding an **anti-freeze protein** to the mixt. of ingredients.

L46 ANSWER 11 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2002:180065 CAPLUS

DOCUMENT NUMBER: 137:262009

TITLE: **Antifreeze protein** and their application in food industry

AUTHOR(S): Dai, Huanqin; Guo, Suojuan; Lu, Cunfu

CORPORATE SOURCE: Biology College, Beijing Forestry University, Beijing, 100083, Peop. Rep. China

SOURCE: Shipin Yu Fajiao Gongye (2001), 27(12), 44-49
CODEN: SPYYDO; ISSN: 0253-990X

PUBLISHER: Shipin Yu Fajiao Gongye

DOCUMENT TYPE: Journal; General Review

LANGUAGE: Chinese

AB A review. **Antifreeze proteins** (AFPs) are the thermal hysteresis proteins that have the ability to modify the growth and inhibit the recrystn. of the ice. This review briefly gives an overview of the feature, activity, biochem. characteristics of many kinds of AFPs. In particular, its possible use in food processing is discussed. In frozen foods, it may inhibit recrystn. during freezing, storage, transport and thawing, thus preserving food texture by reducing cellular damage and also minimizing the loss of nutrients by reducing drip. However, many more studies are needed to properly assess the use of AFPs in food.

L46 ANSWER 12 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2000:15233 CAPLUS

DOCUMENT NUMBER: 132:89240

TITLE: Protein and cDNA sequences encoding Myoxocephalus scorpius **antifreeze protein**, and uses thereof in improving the palatability of cold foods/liquids and in making cells cold-resistant

INVENTOR(S): Hew, Choy L.

PATENT ASSIGNEE(S): HSC Research and Development Limited Partnership, Can.

SOURCE: PCT Int. Appl., 61 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|------|----------|-----------------|------------|
| WO 2000000512 | A2 | 20000106 | WO 1999-CA601 | 19990625 |
| WO 2000000512 | A3 | 20000316 | | |
| W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | | |
| RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | | |
| US 6429293 | B1 | 20020806 | US 1999-344529 | 19990624 |
| AU 9944941 | A1 | 20000117 | AU 1999-44941 | 19990625 |
| PRIORITY APPLN. INFO.: | | | | |
| | | | US 1998-90794P | P 19980626 |
| | | | US 1998-95713P | P 19980807 |
| | | | US 1999-344529 | A 19990624 |
| | | | US 1998-90794 | P 19980626 |
| | | | US 1998-95713 | P 19980807 |
| | | | WO 1999-CA601 | W 19990625 |

AB The invention provides protein and cDNA sequences encoding intracellular "sculpin-type" **antifreeze proteins** (AFPs) which were isolated from shorthorn sculpin (*Myoxocephalus scorpius*). The AFPs of the present invention are alanine-rich polypeptides that are synthesized in the peripheral tissues such as the skin and gills of fish. These skin-type AFPs are encoded by a distinct set of AFP genes that lack a signal peptide, which is indicative of their intracellular location. The AFPs are used to make cells cold resistant and to improve the palatability of cold foods and liqs. Cold-resistant eukaryotes and prokaryotes, including plants, animals and bacteria are made using the disclosed genes/AFP. Moreover, the present invention provides methods for preserving cells, tissues and organs ex vivo using the AFPs described herein.

L46 ANSWER 13 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN
 ACCESSION NUMBER: 1998:106013 CAPLUS
 DOCUMENT NUMBER: 128:163656
 TITLE: Frozen food product containing heat stable **antifreeze protein**
 INVENTOR(S): Lillford, Peter John; McArthur, Andrew John; Sidebottom, Christopher Michael
 PATENT ASSIGNEE(S): Unilever N.V., Neth.; Unilever PLC
 SOURCE: PCT Int. Appl., 35 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 5
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|--|------|----------|-----------------|----------|
| WO 9804699 | A1 | 19980205 | WO 1997-EP3634 | 19970704 |
| W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, | | | | |

DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ,
 LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL,
 PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ,
 VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
 RW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR,
 GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA,
 GN, ML, MR, NE, SN, TD, TG

| | | | | |
|---|----|----------|------------------|-------------|
| AU 9734437 | A1 | 19980220 | AU 1997-34437 | 19970704 |
| AU 726699 | B2 | 20001116 | | |
| EP 918863 | A1 | 19990602 | EP 1997-930515 | 19970704 |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE, PT, IE, FI | | | | |
| EP 923306 | A1 | 19990623 | EP 1997-932792 | 19970704 |
| EP 923306 | B1 | 20030521 | | |
| R: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LI, NL, PT, SE | | | | |
| BR 9710564 | A | 19990817 | BR 1997-10564 | 19970704 |
| CN 1226284 | A | 19990818 | CN 1997-196682 | 19970704 |
| JP 2000515751 | T2 | 20001128 | JP 1998-508417 | 19970704 |
| SK 282279 | B6 | 20020107 | SK 1999-89 | 19970704 |
| AT 240659 | E | 20030615 | AT 1997-932792 | 19970704 |
| GB 2315752 | A1 | 19980211 | GB 1997-14411 | 19970708 |
| GB 2315752 | B2 | 20010613 | | |
| US 6090917 | A | 20000718 | US 1997-890489 | 19970709 |
| ZA 9706472 | A | 19990122 | ZA 1997-6472 | 19970722 |
| ZA 9706473 | A | 19990122 | ZA 1997-6473 | 19970722 |
| ZA 9706477 | A | 19990125 | ZA 1997-6477 | 19970722 |
| FR 2751657 | A1 | 19980130 | FR 1997-9410 | 19970724 |
| FR 2751657 | B1 | 19990625 | | |
| DE 19732135 | A1 | 19980226 | DE 1997-19732135 | 19970725 |
| DE 19732135 | C2 | 19980723 | | |
| ZA 9802151 | A | 19990913 | ZA 1998-2151 | 19980313 |
| KR 2000029554 | A | 20000525 | KR 1999-700612 | 19990125 |
| MX 9900952 | A | 20000131 | MX 1999-952 | 19990126 |
| US 6156880 | A | 20001205 | US 1999-385930 | 19990830 |
| US 6162789 | A | 20001219 | US 1999-385135 | 19990830 |
| PRIORITY APPLN. INFO.: | | | EP 1996-305497 | A 19960726 |
| | | | EP 1996-305499 | A 19960726 |
| | | | EP 1997-301719 | A 19970314 |
| | | | WO 1997-EP3634 | W 19970704 |
| | | | WO 1997-EP3636 | W 19970704 |
| | | | US 1997-890489 | A3 19970709 |

AB A process is disclosed for the recovery of **antifreeze proteins** (AFPs) from natural sources, said process involving the steps of (a) isolating an AFP-contg. juice from a natural source; (b) heat treating the natural source or the AFP-contg. juice to a temp. of .gtoreq.60 .degree.; and (c) removing the insol. fraction. The heat stability of the AFP is esp. important since most previously described AFPs are denatured during some food processing steps such as pasteurization. Natural sources are preferably cold-acclimatized plants but also can include fish, insects, and microorganisms. Examples of preferred plant sources are winter-rye, perennial grasses, and sedges. AFPs of mol. wt. 25, 35, and 65-75 kilodaltons are claimed. Genes encoding these proteins are cloned and expressed in host organisms, and the AFPs used in prodn. of frozen confectionary products such as ice cream. The AFPs are presented at 0.0001-0.5 wt% and have no significant redn. in ice recrystn. inhibition properties after 1 h. treatment at 60.degree., 1 h at 80.degree. or 10 min at 100.degree..

REFERENCE COUNT: 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 14 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN
 ACCESSION NUMBER: 1998:816063 CAPLUS

DOCUMENT NUMBER: 130:62019
 TITLE: Method of expressing **antifreeze proteins** in yeast
 INVENTOR(S): Tripp, Matthew; Lusk, Lance; Rhodes, Thomas; Huige, Nick; Kot, Edward; Chicoye, Etzer; Barney, Michael C.; Bower, Patricia A.; Cronan, Charles L.
 PATENT ASSIGNEE(S): Miller Brewing Company, USA
 SOURCE: U.S., 25 pp., Cont. of U.S. Ser. No. 917,216, abandoned.
 CODEN: USXXAM
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------------------|------|----------|-----------------|----------|
| US 5849537 | A | 19981215 | US 1994-180524 | 19940112 |
| US 5928877 | A | 19990727 | US 1997-975166 | 19971120 |
| PRIORITY APPLN. INFO.: | | | US 1989-409217 | 19890919 |
| | | | US 1990-486333 | 19900228 |
| | | | US 1992-917216 | 19920720 |
| | | | US 1994-180524 | 19940112 |

AB Yeast is genetically engineered by transformation with an expression vector contg. a natural yeast secretion signal sequence combined appropriately with a chem. synthesized gene encoding **antifreeze protein** resulting in the expression, proper processing, and secretion of **antifreeze protein** which is heterologous to yeast in recoverable amts. Disclosed are DNA sequences comprising structural genes encoding peptides having amino acid sequences with the biochem. or physiochem. properties of **antifreeze protein** and a method of combining the **antifreeze protein** gene sequences with appropriate expression vectors.

REFERENCE COUNT: 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 15 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1998:344399 CAPLUS
 DOCUMENT NUMBER: 129:51158
 TITLE: Carrot anti-freeze polypeptides
 PATENT ASSIGNEE(S): Unilever PLC, UK
 SOURCE: Eur. Pat. Appl., 13 pp.
 CODEN: EPXXDW

DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 5
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|--|------|----------|-----------------|----------|
| EP 843010 | A1 | 19980520 | EP 1996-308362 | 19961119 |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI | | | | |
| GB 2315753 | A1 | 19980211 | GB 1997-14412 | 19970708 |
| GB 2315753 | B2 | 20010613 | | |
| ZA 9706472 | A | 19990122 | ZA 1997-6472 | 19970722 |
| US 6096867 | A | 20000801 | US 1997-898351 | 19970722 |
| WO 9822591 | A2 | 19980528 | WO 1997-EP6181 | 19971106 |
| WO 9822591 | A3 | 19980730 | | |
| W: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, | | | | |

LR, LS, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU,
 SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU,
 ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
 RW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR,
 GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA,
 GN, ML, MR, NE, SN, TD, TG

AU 9855509 A1 19980610 AU 1998-55509 19971106
 AU 732169 B2 20010412
 EP 941332 A2 19990915 EP 1997-951868 19971106
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE, PT, IE
 BR 9713984 A 20000208 BR 1997-13984 19971106
 CN 1244895 A 20000216 CN 1997-181371 19971106
 JP 2000513578 T2 20001017 JP 1998-523150 19971106
 ZA 9710338 A 19990517 ZA 1997-10338 19971117
 ZA 9802151 A 19990913 ZA 1998-2151 19980313
 PRIORITY APPLN. INFO.: EP 1996-305497 A 19960726
 EP 1996-305499 A 19960726
 EP 1996-308362 A 19961119
 EP 1997-301719 A 19970314
 EP 1997-301733 A 19970314
 WO 1997-EP6181 W 19971106
 AB Novel antifreeze polypeptides can be isolated from carrots. These
 peptides can favorable influence the properties of consumer products e.g.
 frozen confectionery products. Claims include genes for the
antifreeze protein and antibodies to the
antifreeze protein. For example, one peptide fragment
 claimed has the sequence LEU-PRO-ASN-LEU-PHE-GLY-LYS.
 REFERENCE COUNT: 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS
 RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 16 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN
 ACCESSION NUMBER: 1997:553751 CAPLUS
 DOCUMENT NUMBER: 127:175697
 TITLE: Ice crystal growth-inhibiting proteins from Zoarces
 viviparus serum
 INVENTOR(S): Jann, Alfred; Lundheim, Rolv
 PATENT ASSIGNEE(S): Societe Des Produits Nestle S.A., Switz.
 SOURCE: Eur. Pat. Appl., 9 pp.
 CODEN: EPXXDW
 DOCUMENT TYPE: Patent
 LANGUAGE: French
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|------|----------|-----------------|----------|
| EP 788745 | A1 | 19970813 | EP 1996-200309 | 19960209 |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, NL, PT, SE | | | | |
| CA 2244811 | AA | 19970814 | CA 1997-2244811 | 19970205 |
| WO 9728698 | A1 | 19970814 | WO 1997-EP547 | 19970205 |
| W: AL, AU, BB, BG, BR, CA, CN, CZ, EE, GE, HU, IL, IS, JP, KP, KR, | | | | |
| LK, LR, LT, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, RO, SG, SI, | | | | |
| SK, TR, TT, UA, US, UZ, VN, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | | |
| RW: KE, LS, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, | | | | |
| IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, | | | | |
| MR, NE, SN, TD, TG | | | | |
| AU 9717671 | A1 | 19970828 | AU 1997-17671 | 19970205 |
| AU 725927 | B2 | 20001026 | | |
| EP 886477 | A1 | 19981230 | EP 1997-903229 | 19970205 |
| EP 886477 | B1 | 20020731 | | |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI | | | | |

| | | | | |
|------------------------|----|----------|----------------|------------|
| BR 9707388 | A | 19990413 | BR 1997-7388 | 19970205 |
| CN 1214615 | A | 19990421 | CN 1997-193431 | 19970205 |
| CN 1059784 | B | 20001227 | | |
| JP 2000504569 | T2 | 20000418 | JP 1997-528157 | 19970205 |
| IL 125539 | A1 | 20001206 | IL 1997-125539 | 19970205 |
| AT 221322 | E | 20020815 | AT 1997-903229 | 19970205 |
| ES 2180023 | T3 | 20030201 | ES 1997-903229 | 19970205 |
| NO 9803600 | A | 19981008 | NO 1998-3600 | 19980805 |
| US 6312733 | B1 | 20011106 | US 2000-117588 | 20000308 |
| PRIORITY APPLN. INFO.: | | | EP 1996-200309 | A 19960209 |
| | | | WO 1997-EP547 | W 19970205 |

AB **Antifreeze proteins** may be isolated from serum of the arctic fish *Zoarcetes viviparus*. Food applications are indicated. Thus, incorporation of 0.05% *Z. viviparus* serum into ice cream provides a smooth product following storage at -35.degree..

L46 ANSWER 17 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1997:411186 CAPLUS

DOCUMENT NUMBER: 127:120847

TITLE: Effects of **ice-nucleation** active bacteria on the freezing of some model food systems

AUTHOR(S): Li, Jingkun; Izquierdo, Martha P.; Lee, Tung-Ching

CORPORATE SOURCE: Dep. Food Sci. Center Advanced Food Technology, Rutgers Univ., New Brunswick, NJ, 08903, USA

SOURCE: International Journal of Food Science and Technology (1997), 32(1), 41-49

CODEN: IJFTEZ; ISSN: 0950-5423

PUBLISHER: Blackwell

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Cells of ice-nucleation active (INA) bacteria. *Pseudomonas syringae* and *Erwinia herbicola*, were cultured at 18.degree.C with media of nutrient broth and/or yeast ext. and harvested at late log phase for max. ice nucleation activity. These cells were able to nucleate water to freeze at temps. as high as -2.degree.C. They were incorporated into model food systems, including sugar, protein solns. and oil/water suspensions, representing all major components of foods, to investigate their effects on freezing. The nucleation temps. of all the treated models were significantly raised by between 3.0 and 5.9.degree.C compared with controls when the freezer temp. was set at -6 to -7.degree.C. The application of the INA cells also caused freezing of certain model solns. at -6.degree.C, such as sucrose soln. (10%), which did not freeze at the same conditions without INA bacterial cells. Addns. of INA cells also shortened the total freezing time of the model systems by between 20 and 38%. These results suggest that with the application of bacterial ice nucleation, some current food freezing processes may be modified to operate at higher subzero temps. to provide guaranteed freezing, energy savings and improvement of efficiency and product quality.

L46 ANSWER 18 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1995:836704 CAPLUS

DOCUMENT NUMBER: 123:222570

TITLE: Low temperature growth, freezing survival, and production of **antifreeze protein**

by the plant growth promoting rhizobacterium

Pseudomonas putida GR12-2

AUTHOR(S): Sun, Xiuying; Griffith, Marilyn; Pasternak, J. J.; Glick, Bernard R.

CORPORATE SOURCE: Department Biology, University Waterloo, Waterloo, ON, N2L 3G1, Can.

SOURCE: Canadian Journal of Microbiology (1995), 41(9), 776-84

CODEN: CJMIAZ; ISSN: 0008-4166
PUBLISHER: National Research Council of Canada
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The plant growth promoting rhizobacterium *Pseudomonas putida* GR12-2 was originally isolated from the rhizosphere of plants growing in the Canadian High Arctic. Here, the authors report that this bacterium was able to grow and promote root elongation of both spring and winter canola at 5.degree.C, a temp. at which only a relatively small no. of bacteria are able to proliferate and function. In addn., the bacterium survived exposure to freezing temps., i.e., -20 and -50.degree.C. In an effort to det. the mechanistic basis for this behavior, it was discovered that following growth at 5.degree.C, *P. putida* GR12-2 synthesized and secreted to the growth medium a **protein** with **antifreeze** activity. Anal. of the spent growth medium, following concn. by ultrafiltration, by SDS-polyacrylamide gel electrophoresis revealed the presence of one major protein with a mol. mass of approx. 32-34 kDa and a no. of minor proteins. However, it is not known which of these **proteins** contains the **antifreeze** activity.

✓ L46 ANSWER 19 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1995:970630 CAPLUS

DOCUMENT NUMBER: 124:28174

TITLE: **Antifreeze proteins** and their potential use in frozen foods.

AUTHOR(S): Griffith, Marilyn; Ewart, K. Vanya

CORPORATE SOURCE: Department of Biology, University of Waterloo, Waterloo, ON, N2L 3G1, Can.

SOURCE: Biotechnology Advances (1995), 13(3), 375-402

CODEN: BIADDD; ISSN: 0734-9750

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal; General Review

LANGUAGE: English

AB A review with many refs. **Antifreeze proteins** (AFPs) are proteins that have the ability to modify the growth of ice, resulting in the stabilization of ice crystals over a defined temp. range and in the inhibition of the recrystn. of ice. AFPs are found in a wide range of organisms, including bacteria, fungi, plants, invertebrates and fish. Moreover, multiple forms of AFPs are synthesized within each organism. As a result, it should be possible to select an AFP with appropriate characteristics and a suitable level of activity for a particular food product. **Antifreeze proteins** may improve the quality of foods that are eaten while frozen by inhibiting recrystn. and maintaining a smooth texture. In foods that are frozen only for preservation, AFPs may inhibit recrystn. during freezing, storage, transport and thawing, thus preserving food texture by reducing cellular damage and also minimizing the loss of nutrients by reducing drip. **Antifreeze proteins** are naturally present in many foods consumed as part of the human diet. However, AFPs may be introduced into other food products either by phys. processes, such as mixing and soaking, or by gene transfer.

L46 ANSWER 20 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1994:603909 CAPLUS

DOCUMENT NUMBER: 121:203909

TITLE: **Ice-nucleating** bacteria or agents for preparation of frozen foods

INVENTOR(S): Kobayashi, Etsuo; Obata, Hitoshi

PATENT ASSIGNEE(S): Nagano Prefecture, Japan; Obata Hitoshi

SOURCE: Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|-------------|------|----------|-----------------|----------|
| JP 06181729 | A2 | 19940705 | JP 1992-356066 | 19921219 |

PRIORITY APPLN. INFO.: JP 1992-356066 19921219

AB Frozen foods are prepd. by the addn. of ice-nucleating bacteria or agents into the foods and/or coating the foods with the ice-nucleating bacteria or agents. The ice-nucleating bacteria is selected from *Pseudomonas fluorescens* KUIN-1, *Pseudomonas* IF03310, and/or *Pseudomonas* IFO 12686. Prepn. of gelidium jelly was shown.

L46 ANSWER 21 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN
 ACCESSION NUMBER: 1994:603742 CAPLUS
 DOCUMENT NUMBER: 121:203742
 TITLE: The effects of **antifreeze proteins** on chilled and frozen meat
 AUTHOR(S): Payne, S. R.; Sandford, D.; Harris, A.; Young, O. A.
 CORPORATE SOURCE: Meat Ind. Res. Inst. New Zealand (Inc.), Hamilton, N. Z.
 SOURCE: Meat Science (1994), 37(3), 429-38
 CODEN: MESCDN; ISSN: 0309-1740
 DOCUMENT TYPE: Journal
 LANGUAGE: English

AB The effects of cryoprotectant **proteins**, trivially termed **antifreeze proteins**, from the Antarctic cod (*Dissostichus mawsoni*) and the winter flounder (*Pseudopleuronectes americanus*) were assessed in meat during chilling and freezing. In light-microscopy studies, bovine sternomandibularis muscle samples were soaked in phosphate buffered saline with and without 0.1 mg/mL **antifreeze protein**. Samples were then held frozen (-20.degree.) or chilled (2.degree.) for 3 days. Samples were freeze-substituted, embedded in resin, and sectioned. With **antifreeze protein** present, transverse sections of frozen samples had many small intracellular spaces, probably representing ice crystals. Frozen controls had much larger intracellular single spaces. **Antifreeze protein** had no effect on chilled samples. Similarly treated samples were examd. by SEM using a cryostage attachment. Chilled ovine peroneus longus muscle samples were soaked for various periods (0-7 days) in 0.9% saline contg. various concns. of **antifreeze proteins** (0-1 mg/mL). Samples were then held frozen (-20.degree.) or chilled (2.degree.) for 5 or 7 days. With frozen samples, **antifreeze proteins** reduced the size of ice crystals, compared to the control. This effect depended upon the concn. used and the period of soaking before the samples were frozen, but was independent of source. **Antifreeze proteins** had no effect on chilled samples.

L46 ANSWER 22 OF 40 CAPLUS COPYRIGHT 2003 ACS on STN
 ACCESSION NUMBER: 1991:423706 CAPLUS
 DOCUMENT NUMBER: 115:23706
 TITLE: Recombinant manufacture of **ice-nucleating** proteins of *Pseudomonas*
 INVENTOR(S): Hottinger, Herbert; Niederberger, Peter; Pridmore, David; Staeger-Roose, Ursula
 PATENT ASSIGNEE(S): Societe des Produits Nestle S. A., Switz.
 SOURCE: Eur. Pat. Appl., 53 pp.
 CODEN: EPXXDW

DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|------|----------|-----------------|----------|
| EP 424771 | A1 | 19910502 | EP 1990-119700 | 19901015 |
| EP 424771 | B1 | 19941019 | | |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE | | | | |
| HU 61884 | A2 | 19930329 | HU 1990-6403 | 19901010 |
| IL 95983 | A1 | 19970110 | IL 1990-95983 | 19901014 |
| ES 2066084 | T3 | 19950301 | ES 1990-119700 | 19901015 |
| AU 9064690 | A1 | 19910502 | AU 1990-64690 | 19901016 |
| AU 642914 | B2 | 19931104 | | |
| FI 97729 | B | 19961031 | FI 1990-5081 | 19901016 |
| FI 97729 | C | 19970210 | | |
| CA 2027852 | AA | 19910426 | CA 1990-2027852 | 19901017 |
| NO 9004532 | A | 19910426 | NO 1990-4532 | 19901019 |
| NO 180181 | B | 19961125 | | |
| NO 180181 | C | 19970305 | | |
| GB 2237275 | A1 | 19910501 | GB 1990-23117 | 19901024 |
| GB 2237275 | B2 | 19940427 | | |
| ZA 9008522 | A | 19910828 | ZA 1990-8522 | 19901024 |
| JP 03210160 | A2 | 19910913 | JP 1990-286943 | 19901024 |
| JP 2648389 | B2 | 19970827 | | |
| BR 9005387 | A | 19910917 | BR 1990-5387 | 19901024 |
| US 5514586 | A | 19960507 | US 1992-963290 | 19921019 |
| PRIORITY APPLN. INFO.: | | | GB 1989-23998 | 19891025 |
| | | | US 1990-596203 | 19901011 |

AB The ice-nucleation protein of *Pseudomonas* is manufd. for use in freezing of foods or pharmaceuticals by expression of the gene in generally-recognized-as-safe microorganisms. Preferred hosts are *Saccharomyces cerevisiae* and *Lactococcus*. A ice-nucleation protein gene was cloned using amino acid sequence-derived oligonucleotides as probes to screen a chromosomal DNA bank from a novel isolate of *Pseudomonas* from soil in *Escherichia coli*. Colonies carrying the genes froze much more rapidly than did controls in a std. freezing test. The gene was expressed from the glyceraldehyde-3-phosphate dehydrogenase or *UBI4* gene promoter in *Saccharomyces cerevisiae* using yeast signal peptides to direct the protein to the vacuole or to export it.

✓ L46 ANSWER 23 OF 40 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
 ACCESSION NUMBER: 2002:447971 BIOSIS
 DOCUMENT NUMBER: PREV200200447971
 TITLE: Novel methods for rapid freezing and thawing of
 foods: A review.
 AUTHOR(S): Li, Bing; Sun, Da-Wen (1)
 CORPORATE SOURCE: (1) FRCFT Group, Department of Agricultural and Food
 Engineering, University College Dublin, National University
 of Ireland, Earlsfort Terrace, Dublin, 2: dawen.sun@ucd.ie,
 www.ucd.ie/ refrig Ireland
 SOURCE: Journal of Food Engineering, (September, 2002) Vol. 54, No.
 3, pp. 175-182. <http://www.elsevier.com/locate/jfoodeng>.
 print.
 ISSN: 0260-8774.
 DOCUMENT TYPE: General Review
 LANGUAGE: English

AB This paper reviews new developments in methods of freezing (high-pressure freezing, dehydrofreezing and applications of **antifreeze protein** and **ice nucleation protein**) and

thawing (high-pressure and microwave thawing, ohmic thawing and acoustic thawing) for foods. With a good understanding of the solid-liquid phase diagram of water, the effects of pressure on food freezing-thawing cycles are highlighted. High-pressure freezing promotes uniform and rapid **ice nucleation** and growth through the whole sample. Dehydrofreezing has been successfully used in freezing of vegetables and fruits with the advantage of less damage to plant texture because of partial water removal before freezing. Recently, studies have been carried out for the biotechnological use of antifreeze and **ice nucleation** proteins because of their uniqueness in directly improving freezing processes. Thawing under pressure can be achieved at lower temperature than that at atmospheric pressures. Finally microwave, ohmic and acoustic thawing are described. It is hoped that this paper will attract more research in novel freezing and thawing processes and methods.

L46 ANSWER 24 OF 40 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 2003:65633 BIOSIS
DOCUMENT NUMBER: PREV200300065633
TITLE: Isolation and characterization of freezing tolerance related genes from **barley**.
AUTHOR(S): Hwang Cheol H. (1); Park Hyun W. (1); Hwang Eun Y. (1); Min Sung R.; Liu Jang R.
CORPORATE SOURCE: (1) School of Bioresource Sciences, Dankook University, Cheonan, South Korea: sfeho@anseo.dankook.ac.kr South Korea
SOURCE: Plant Biology (Rockville), (2000) Vol. 2000, pp. 198. print.
Meeting Info.: Annual Meeting of the American Society of Plant Physiologists San Diego, California, USA July 15-19, 2000 American Society of Plant Physiologists (ASPP)
DOCUMENT TYPE: Conference
LANGUAGE: English

L46 ANSWER 25 OF 40 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 2000:524502 BIOSIS
DOCUMENT NUMBER: PREV200000524502
TITLE: A comprehensive evaluation of the effects and mechanisms of **antifreeze proteins** during low-temperature **preservation**.
AUTHOR(S): Wang, Jun-Hui (1)
CORPORATE SOURCE: (1) College of Life Science, Zhejiang University, Wensan Road, Hangzhou, 310012 China
SOURCE: Cryobiology, (August, 2000) Vol. 41, No. 1, pp. 1-9. print. ISSN: 0011-2240.
DOCUMENT TYPE: General Review
LANGUAGE: English
SUMMARY LANGUAGE: English

AB During the past 10 years, it has become clear that the effects of **antifreeze proteins** (AFPs) on cell viability and on thermodynamic properties during low-temperature preservation are complex, even controversial. In this paper, these studies are reviewed systematically and some conclusions are drawn. It is shown that AFPs can display both protective and cytotoxic actions and both nucleation of ice and inhibition of ice crystal growth, depending on several factors; these include the specific storage protocol, the dose and type of AFP, the composition and concentration of cryoprotectant, and the features of the biological material. A novel model, incorporating some recent findings concerning these proteins, is proposed to explain this dual effect of AFPs during cryopreservation. AFP-ice complexes have some affinity interactions with cell membranes and with many other molecules present in cryopreservation solutions. When the intensity of these interactions

reaches a certain level, the AFP-ice complexes may be induced to aggregate, thereby inducing **ice nucleation** and loss of the ability to inhibit recrystallization.

L46 ANSWER 26 OF 40 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 1998:175586 BIOSIS
DOCUMENT NUMBER: PREV199800175586
TITLE: Isolation and characterization of an **antifreeze protein with ice nucleation** activity from the plant growth promoting rhizobacterium **Pseudomonas putida** GR12-2.
AUTHOR(S): Xu, Hao; Griffith, Marilyn; Patten, Cheryl L.; Glick, Bernard R. (1)
CORPORATE SOURCE: (1) Dep. Biology, Univ. Waterloo, Waterloo, ON N2L 3G1 Canada
SOURCE: Canadian Journal of Microbiology, (Jan., 1998) Vol. 44, No. 1, pp. 64-73.
ISSN: 0008-4166.
DOCUMENT TYPE: Article
LANGUAGE: English
SUMMARY LANGUAGE: English; French

AB An **antifreeze protein** secreted to the growth medium by the plant growth promoting rhizobacterium **Pseudomonas putida** GR12-2 was purified to apparent homogeneity. The purified protein has a molecular mass of 164+-15 kDa and an isoelectric point of 5.3, contains both carbohydrate and lipid moieties, and is relatively rich in glycine and alanine. The properties of the purified **antifreeze protein** are similar to the properties previously reported for bacterial **ice-nucleation** proteins. In fact, the purified **antifreeze protein** also displays a low level of **ice-nucleation** activity. Removal of approximately 92 kDa of carbohydrate from the 164-kDa antifreeze glycoprotein did not noticeably alter the antifreeze activity of the molecule, although it did diminish the **ice-nucleation** activity. This is the first report of an **antifreeze protein** that also is active as an **ice-nucleation** protein.

L46 ANSWER 27 OF 40 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 1994:119447 BIOSIS
DOCUMENT NUMBER: PREV199497132447
TITLE: Antifreeze **glycoproteins** increase solution viscosity.
AUTHOR(S): Eto, Takeshi Kurt; Rubinsky, Boris (1)
CORPORATE SOURCE: (1) Biomed. Eng. Lab., Dep. Mechanical Eng., Univ. Calif. at Berkeley, Berkeley, CA 94720 USA
SOURCE: Biochemical and Biophysical Research Communications, (1993) Vol. 197, No. 2, pp. 927-931.
ISSN: 0006-291X.
DOCUMENT TYPE: Article
LANGUAGE: English

AB A new microsensor that can analyze microliter volume samples was used to measure the viscosity of aqueous solutions of antifreeze glycoproteins as a function of temperature and concentration. The results show that at physiological concentrations which naturally occur in the fish, the **antifreeze proteins** significantly increase aqueous solution viscosity. The probability for **ice nucleation** is inversely proportional to viscosity. Therefore, the increased viscosity could explain, in part, reports on the beneficial effects of antifreeze glycoproteins during cryopreservation by vitrification. Reducing the probability for **ice nucleation** could be also beneficial for the survival of cold-water fish in their natural habitat.

Millimolar concentrations of **antifreeze proteins** increase aqueous solution viscosity to values comparable with those of conventional cryoprotectants in molar concentrations.

L46 ANSWER 28 OF 40 BIOTECHNO COPYRIGHT 2003 Elsevier Science B.V. on STN
ACCESSION NUMBER: 1995:02654751 BIOTECHNO
TITLE: **Antifreeze proteins** and their potential use in **frozen foods**
AUTHOR: Griffith M.; Ewart K.V.
CORPORATE SOURCE: Univ.Waterloo,Dept Biol., Waterloo, N2L 3G1, Canada.
SOURCE: Biotechnology Advances, (1995), 13/3 (325-352)
ISSN: 0734-9750
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English

L46 ANSWER 29 OF 40 JICST-EPlus COPYRIGHT 2003 JST on STN
ACCESSION NUMBER: 980919764 JICST-EPlus
TITLE: Inhibition of Ice Formation by Proteins.
AUTHOR: OBATA HITOSHI
CORPORATE SOURCE: Kansai Univ., Fac. of Eng.
SOURCE: Reito (Refrigeration), (1998) vol. 73, no. 851, pp. 791-794. Journal Code: G0176A (Fig. 11, Ref. 34)
CODEN: RITOA8; ISSN: 0034-3714
PUB. COUNTRY: Japan
DOCUMENT TYPE: Journal; Commentary
LANGUAGE: Japanese
STATUS: New

AB Inhibition of ice growth in supercooled solution by certain proteins is vital to the survival of many living organisms. Some fish, native to both subzero northern and southern waters, have special proteins or glycoproteins in their blood serum that inhibit ice formation. Strain KINI-1 capable of producing an antifreeze agent was isolated from a camphor leaf. Strain KINI-1 was identified as *Acinetobacter calcoaceticus* from its characteristics and taxonomics. As the activity of this agent disappeared with the application of protease treatment, this agent, which was an **antifreeze protein**(AFP) was partially purified from the culture to an electrophoretically main band state by ultrafiltration, acetone precipitate, various chromatography. The AFP had various substrate specificities for ice nuclei from various ice-nucleating bacteria and AgI. (author abst.)

L46 ANSWER 30 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
ACCESSION NUMBER: 2002-380753 [41] WPIDS
CROSS REFERENCE: 1998-042182 [04]; 2000-086220 [07]
DOC. NO. NON-CPI: N2002-297825
DOC. NO. CPI: C2002-107423
TITLE: New class of thermal hysteresis, **antifreeze proteins** isolated and purified from *Choristoneura* species for decreasing the freezing point of aqueous solution and to protect plants from climatic freezing conditions.
DERWENT CLASS: B04 D16 S03
INVENTOR(S): DAVIES, P L; RAHAVARD, M; TYSHENKO, M G; WALKER, V K
PATENT ASSIGNEE(S): (TOOH) UNIV QUEENS KINGSTON
COUNTRY COUNT: 1
PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|------------|------|----------|-----------|----|----|
| US 6348569 | B1 | 20020219 | (200241)* | | 27 |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|------------|-----------|----------------|----------|
| US 6348569 | B1 CIP of | US 1996-657264 | 19960603 |
| | Div ex | US 1997-868594 | 19970603 |
| | | US 1999-434323 | 19991104 |

FILING DETAILS:

| PATENT NO | KIND | PATENT NO |
|------------|-----------|------------|
| US 6348569 | B1 Div ex | US 6008016 |

PRIORITY APPLN. INFO: US 1997-868594 19970603; US 1996-657264
19960603; US 1999-434323 19991104

AB US 6348569 B UPAB: 20020701

NOVELTY - An isolated or recombinantly expressed **antifreeze protein** (THP), comprising a molecular weight of 5-20 kDa as determined by molecular exclusion chromatography, a thermal hysteresis activity of greater than 1.5 deg. C at a concentration of 1 mg/mL, and exhibiting specific binding to an antibody raised against an **antifreeze protein** of 108 or 90 amino acids given in the specification, is new.

DETAILED DESCRIPTION - An isolated or recombinantly expressed **antifreeze protein** (THP), comprising a molecular weight of 5-20 kDa, a thermal hysteresis activity of greater than 1.5 deg. C at a concentration of 1 mg/mL, and exhibits specific binding to an antibody raised against an **antifreeze protein** of 108 or 90 amino acids given in the specification, and is encoded by a nucleic acid which specifically hybridizes to a nucleic acid comprising a sequence of 1387 base pairs under stringent conditions which include a wash step comprising a wash in 0.2xSSC (standard saline citrate) at 65 deg. C for 1.5 minutes, is new.

An INDEPENDENT CLAIM is also included for a liquid comprising THP.

USE - THP is useful for decreasing the freezing point of an aqueous solution (claimed). THP is useful to suppress ice crystal growth and when gene encoding THP is introduced into plant foodstuffs it confers general resistance to damage from subfreezing climatic conditions, or into a plant part such as the fruit or vegetable portion minimizes damage specifically to those particular plant organs upon freezing. Exemplary plant parts are stems, roots, leaves, flowers, petioles, pericarp, seeds, vegetative tissue, and tubers. The texture, taste and storage life of **frozen vegetables** and fruits are improved, for e.g., potatoes, asparagus, peas, carrot and spinach, and strawberries, blueberries, raspberries, citrus fruits, bananas, grapes, kiwis, peaches, pineapples, plums, cherries, tomatoes and mangoes. Gene encoding THP is useful to transform microorganisms which when added to foodstuffs, protect the foodstuffs or the microorganism from freezing. *Streptococcus thermophilus* and *Lactobacillus bulgaricus* can be added to dairy products and THP expressed by the bacteria will protect the product from home freezer freeze-thaw cycles and produce a more palatable product. When transformed into dough yeast and using the yeast in frozen dough, the dough will naturally leaven upon thawing as the yeast viability will remain high upon thawing. THP is useful for producing transgenic fish (e.g. members of the family Salmonidae, halibut, sablefish or any edible saltwater species) that can withstand sub-zero temperatures. Compositions based on THPs are suitable for depressing the freezing point or inhibiting freezing in non-organic systems.

ADVANTAGE - THP provides longer shelf-life to the foodstuffs and makes them more palatable.

Dwg.0/3

L46 ANSWER 31 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
 ACCESSION NUMBER: 2000-594241 [56] WPIDS
 CROSS REFERENCE: 2000-594237 [56]; 2000-594238 [56]; 2000-594239 [56];
 2000-594240 [56]
 DOC. NO. CPI: C2000-177444
 TITLE: Ice confection product used in ice
 cream comprises an **antifreeze**
protein.
 DERWENT CLASS: D13
 INVENTOR(S): DANIEL, A M; OLDROYD, J R; DANIEL, A
 PATENT ASSIGNEE(S): (UNIL) UNILEVER PLC; (UNIL) UNILEVER NV; (HIND-N)
 HINDUSTAN LEVER LTD
 COUNTRY COUNT: 90
 PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|---|------|----------|-----------|----|----|
| WO 2000053029 | A1 | 20000914 | (200056)* | EN | 74 |
| RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW | | | | | |
| W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW | | | | | |
| AU 2000032848 | A | 20000928 | (200067) | | |
| EP 1158864 | A1 | 20011205 | (200203) | EN | |
| R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI | | | | | |
| BR 2000008889 | A | 20011226 | (200206) | | |
| CN 1350432 | A | 20020522 | (200258) | | |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|---------------|------|----------------|----------|
| WO 2000053029 | A1 | WO 2000-EP1760 | 20000302 |
| AU 2000032848 | A | AU 2000-32848 | 20000302 |
| EP 1158864 | A1 | EP 2000-910746 | 20000302 |
| | | WO 2000-EP1760 | 20000302 |
| BR 2000008889 | A | BR 2000-8889 | 20000302 |
| | | WO 2000-EP1760 | 20000302 |
| CN 1350432 | A | CN 2000-807400 | 20000302 |

FILING DETAILS:

| PATENT NO | KIND | PATENT NO |
|---------------|-------------|---------------|
| AU 2000032848 | A Based on | WO 2000053029 |
| EP 1158864 | A1 Based on | WO 2000053029 |
| BR 2000008889 | A Based on | WO 2000053029 |

PRIORITY APPLN. INFO: EP 1999-305842 19990723; GB 1999-5524
 19990310

AB WO 200053029 A UPAB: 20020916

NOVELTY - An ice confection product having a volume 1 - 20 ml and a thickness greater than 5 mm comprise an **antifreeze**
protein.

DETAILED DESCRIPTION - The ice confection product having a volume of 1 - 20 ml and a thickness greater than 5 mm comprises an

antifreeze protein. The confection has a Delta modulus/original modulus (a) and/or a Delta strength /original strength (b) at least 0.4. When (a) is at most 6, then Delta modulus is at least 50 (preferably 90, especially 100) MPa and/or when (b) is at most 2, then Delta strength is at least 0.2 MPa.

An INDEPENDENT CLAIM is included for an ice confection which is long lasting in the mouth.

USE - The ice confection can be used as an entire product or may be a component of a composite product. e.g. an **ice cream** core coated with a layer of the water ice, a sweet composed of two halves having a different flavor or color.

ADVANTAGE - The ice confection product is long lasting in the mouth and is more refreshing. The product has an excellent color distinction and provides multi-layered products with no merging of the different colors over time, even when the layers are thin. The product retains its structural integrity for a longer time at ambient temperatures. The product can conveniently be sold in multi-packs like boiled sweets.
Dwg.0/11

L46 ANSWER 32 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
 ACCESSION NUMBER: 2000-594240 [56] WPIDS
 CROSS REFERENCE: 2000-594237 [56]; 2000-594238 [56]; 2000-594239 [56];
 2000-594241 [56]
 DOC. NO. CPI: C2000-177443
 TITLE: Ice confection used in **ice cream**
 comprises an **antifreeze protein**.
 DERWENT CLASS: D13
 INVENTOR(S): DANIEL, A M; LACY, I; OLDROYD, J R; DANIEL, A
 PATENT ASSIGNEE(S): (UNIL) UNILEVER PLC; (UNIL) UNILEVER NV; (HIND-N)
 HINDUSTAN LEVER LTD
 COUNTRY COUNT: 90
 PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|--|------|----------|-----------|----|----|
| WO 2000053028 | A1 | 20000914 | (200056)* | EN | 36 |
| RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW | | | | | |
| AU 2000039602 | A | 20000928 | (200067) | | |
| EP 1158866 | A1 | 20011205 | (200203) | EN | |
| R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI | | | | | |
| BR 2000008888 | A | 20011218 | (200209) | | |
| CN 1350429 | A | 20020522 | (200258) | | |
| EP 1158866 | B1 | 20021127 | (200279) | EN | |
| R: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE | | | | | |
| DE 60000864 | E | 20030109 | (200312) | | |
| ES 2187459 | T3 | 20030616 | (200345) | | |
| AU 761044 | B | 20030529 | (200346) | | |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|---------------|------|----------------|----------|
| WO 2000053028 | A1 | WO 2000-EP1759 | 20000302 |
| AU 2000039602 | A | AU 2000-39602 | 20000302 |
| EP 1158866 | A1 | EP 2000-918753 | 20000302 |

| | | | |
|---------------|----|----------------|----------|
| BR 2000008888 | A | WO 2000-EP1759 | 20000302 |
| | | BR 2000-8888 | 20000302 |
| | | WO 2000-EP1759 | 20000302 |
| CN 1350429 | A | CN 2000-807385 | 20000302 |
| EP 1158866 | B1 | EP 2000-918753 | 20000302 |
| | | WO 2000-EP1759 | 20000302 |
| DE 60000864 | E | DE 2000-600864 | 20000302 |
| | | EP 2000-918753 | 20000302 |
| | | WO 2000-EP1759 | 20000302 |
| ES 2187459 | T3 | EP 2000-918753 | 20000302 |
| AU 761044 | B | AU 2000-39602 | 20000302 |

FILING DETAILS:

| PATENT NO | KIND | | PATENT NO |
|---------------|------|----------------|---------------|
| AU 2000039602 | A | Based on | WO 2000053028 |
| EP 1158866 | A1 | Based on | WO 2000053028 |
| BR 2000008888 | A | Based on | WO 2000053028 |
| EP 1158866 | B1 | Based on | WO 2000053028 |
| DE 60000864 | E | Based on | EP 1158866 |
| | | Based on | WO 2000053028 |
| ES 2187459 | T3 | Based on | EP 1158866 |
| AU 761044 | B | Previous Publ. | AU 2000039602 |
| | | Based on | WO 2000053028 |

PRIORITY APPLN. INFO: EP 1999-305842 19990723; GB 1999-5524
19990310

AB WO 200053028 A UPAB: 20030719

NOVELTY - To restrict the flow of flavor or color ions or molecules present as either solutes or dispersion within an ice confection, an **antifreeze protein** is used.

USE - The ice confection can be used as an entire product or may be included within a composite product e.g. an **ice cream** core coated with a layer of the water ice.

ADVANTAGE - The **antifreeze protein** restricts the flow of flavor or color ions or molecules present as solutes or dispersion. Thus multi component products can be provided each component having a different flavor and/or color. The ice confection retains the flavor and/or color during the total consumption time.

Dwg.0/5

L46 ANSWER 33 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
 ACCESSION NUMBER: 2000-594239 [56] WPIDS
 CROSS REFERENCE: 2000-594237 [56]; 2000-594238 [56]; 2000-594240 [56];
 2000-594241 [56]
 DOC. NO. CPI: C2000-177442
 TITLE: Water ice comprises an **antifreeze protein**, a stabilizer and a protein based aerating agent.
 DERWENT CLASS: D13
 INVENTOR(S): DANIEL, A M; LACY, I; OLDROYD, J R; DANIEL, A
 PATENT ASSIGNEE(S): (HIND-N) HINDUSTAN LEVER LTD; (UNIL) UNILEVER NV; (UNIL) UNILEVER PLC
 COUNTRY COUNT: 90
 PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|---|------|----------|-----------|----|----|
| WO 2000053027 | A1 | 20000914 | (200056)* | EN | 41 |
| RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL | | | | | |

OA PT SD SE SL SZ TZ UG ZW
 W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES
 FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS
 LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL
 TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
 AU 2000029172 A 20000928 (200067)
 EP 1158862 A1 20011205 (200203) EN
 R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT
 RO SE SI
 BR 2000008887 A 20011218 (200209)
 CN 1358066 A 20020710 (200278)

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|---------------|------|----------------|----------|
| WO 2000053027 | A1 | WO 2000-EP1758 | 20000302 |
| AU 2000029172 | A | AU 2000-29172 | 20000302 |
| EP 1158862 | A1 | EP 2000-907659 | 20000302 |
| | | WO 2000-EP1758 | 20000302 |
| BR 2000008887 | A | BR 2000-8887 | 20000302 |
| | | WO 2000-EP1758 | 20000302 |
| CN 1358066 | A | CN 2000-807395 | 20000302 |

FILING DETAILS:

| PATENT NO | KIND | PATENT NO |
|---------------|-------------|---------------|
| AU 2000029172 | A Based on | WO 2000053027 |
| EP 1158862 | A1 Based on | WO 2000053027 |
| BR 2000008887 | A Based on | WO 2000053027 |

PRIORITY APPLN. INFO: EP 1999-305842 19990723; GB 1999-5524
 19990310

AB WO 200053027 A UPAB: 20021204

NOVELTY - A water ice comprises an **antifreeze protein**, a stabilizer and a protein based aerating agent (not less than 0.1 wt.%). The water ice is obtained by aerating the ice confection with an aerating gas containing a water soluble gas (at least 50 vol.%) such as carbon dioxide and/or nitrous oxide.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for preparing the water ice by aerating the water ice composition, freezing in a freezer having a residence time of 2.5 - 10 minutes and two-stage hardening.

USE - The water ice can be used as an entire product or may be a component of a composite product e.g. a soft **ice cream** core can be coated with a layer of the water ice. The water ice can also be incorporated into ice confections or may be provided as a coating e.g. a water glaze or a non-aerated water ice on at least one surface.

ADVANTAGE - The water ice has novel textures and/or properties which can be retained during packaging, storage and distribution. The products formed have complex, highly defined shapes with non-sticky surfaces.

Dwg.0/5

L46 ANSWER 34 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
 ACCESSION NUMBER: 2000-594238 [56] WPIDS
 CROSS REFERENCE: 2000-594237 [56]; 2000-594239 [56]; 2000-594240 [56];
 2000-594241 [56]
 DOC. NO. CPI: C2000-177441
 TITLE: Ice confection for use as e.g. **ice cream** comprises an **antifreeze protein** with specified apparent modulus and

strength.
 D13
 DERWENT CLASS:
 INVENTOR(S): DANIEL, A M; HODDLE, A; JONES, A; OLDROYD, J R;
 SINGLETON, S; DANIEL, A
 PATENT ASSIGNEE(S): (UNIL) UNILEVER PLC; (UNIL) UNILEVER NV; (HIND-N)
 HINDUSTAN LEVER LTD
 COUNTRY COUNT: 90
 PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|---|------|----------|-----------|----|----|
| WO 2000053026 | A1 | 20000914 | (200056)* | EN | 74 |
| RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW | | | | | |
| W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW | | | | | |
| AU 2000032847 | A | 20000928 | (200067) | | |
| EP 1158863 | A1 | 20011205 | (200203) | EN | |
| R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI | | | | | |
| BR 2000008886 | A | 20011218 | (200209) | | |
| CN 1350431 | A | 20020522 | (200258) | | |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|---------------|------|----------------|----------|
| WO 2000053026 | A1 | WO 2000-EP1757 | 20000302 |
| AU 2000032847 | A | AU 2000-32847 | 20000302 |
| EP 1158863 | A1 | EP 2000-910745 | 20000302 |
| | | WO 2000-EP1757 | 20000302 |
| BR 2000008886 | A | BR 2000-8886 | 20000302 |
| | | WO 2000-EP1757 | 20000302 |
| CN 1350431 | A | CN 2000-807387 | 20000302 |

FILING DETAILS:

| PATENT NO | KIND | PATENT NO |
|---------------|-------------|---------------|
| AU 2000032847 | A Based on | WO 2000053026 |
| EP 1158863 | A1 Based on | WO 2000053026 |
| BR 2000008886 | A Based on | WO 2000053026 |

PRIORITY APPLN. INFO: EP 1999-305842 19990723; GB 1999-5524
 19990310

AB WO 200053026 A UPAB: 20020916

NOVELTY - An ice confection comprises an **antifreeze protein** which comprises at least 0.4 Delta modulus/original modulus and/or at least 0.4 Delta strength(approx. S asterisk)/original strength provided that when Delta modulus/original modulus at most 6.0, Delta modulus at least 50 MPa and/or Delta strength/original strength at most 2.0, Delta strength is at least 0.2 MPa.

USE - As an unaerated frozen yoghurt and frozen custard aerated and unaerated sherbet, granitas and frozen fruit purees. The ice confection is used to provide an ice confection product which has a high degree of definition (claimed).

ADVANTAGE - The ice confection has a high degree of definition. Inclusion of specific **antifreeze protein** into selected ice confections results in the formation of a strong, close-packed

continuous network of ice crystals within the ice confection. The ice confection has increased hardness. The confection has different shapes, textures and properties. Unlike the prior art the confection can be shaped in complex shapes of cartoon characters that do not break off during manufacture, packaging, storage or transportation. Also, it shows shape retention at ambient temperature.

Dwg.0/19

L46 ANSWER 35 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
 ACCESSION NUMBER: 1999-153795 [13] WPIDS
 DOC. NO. NON-CPI: N1999-110800
 DOC. NO. CPI: C1999-045522
 TITLE: New nucleic acid encoding antifreeze polypeptides from plants - particularly with chitinase activity, used to impart frost, and pathogen, resistant to plants, for preservation of foods, cells etc. and for treating tumours.
 DERWENT CLASS: B04 C06 D13 D16 P13 P14
 INVENTOR(S): GRIFFITH, M; HEW, C; MOFFATT, B; XIONG, F
 PATENT ASSIGNEE(S): (ICEB-N) ICE BIOTECH INC
 COUNTRY COUNT: 83
 PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|--|------|----------|-----------|----|-----|
| WO 9906565 | A2 | 19990211 | (199913)* | EN | 117 |
| RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SZ UG ZW | | | | | |
| W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW | | | | | |
| AU 9886206 | A | 19990222 | (199927) | | |
| EP 1002101 | A2 | 20000524 | (200030) | EN | |
| R: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE | | | | | |
| CN 1273604 | A | 20001115 | (200115) | | |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|------------|------|----------------|----------|
| WO 9906565 | A2 | WO 1998-CA745 | 19980731 |
| AU 9886206 | A | AU 1998-86206 | 19980731 |
| EP 1002101 | A2 | EP 1998-937376 | 19980731 |
| | | WO 1998-CA745 | 19980731 |
| CN 1273604 | A | CN 1998-809742 | 19980731 |

FILING DETAILS:

| PATENT NO | KIND | PATENT NO |
|------------|-------------|------------|
| AU 9886206 | A Based on | WO 9906565 |
| EP 1002101 | A2 Based on | WO 9906565 |

PRIORITY APPLN. INFO: US 1997-903872 19970731

AB WO 9906565 A UPAB: 19990331

Nucleic acid (I), isolated from monocotyledonous plants and encoding an **antifreeze protein** (II) is new.

Also new are:

- (1) **antifreeze protein** (II);
- (2) mimetics (III) of (II);

(3) any cold-induced antifreeze polypeptide (IIa), particularly pathogen related, isolated from a monocotyledon, and its mimetics;

(4) isolated antifreeze polypeptide isolated from spring or winter wheat, (spring) rye, (winter) barley, winter canola, spring oats and kale;

(5) recombinant DNA (Ia) comprising (I) linked to a transcription promoter;

(6) system for expressing a chitinase gene comprising expression vector containing chitinase cDNA;

(7) plants, animals (or their cells), bacteria and yeast transformed with (I) or (Ia), or the system of (6);

(8) nucleotide sequence (IV) that targets protein secretion in plants comprising the 5'-part of (I), or its complement;

(9) increasing the ability of an antifreeze polypeptide (AFP) to inhibit recrystallisation of ice and to modify normal growth of ice by combination with sugars.

USE - (II), (IIa) and the products of (6) are used to increase freezing tolerance of plants and microorganisms; to increase field survival of plants, animals and microorganisms exposed to subzero temperatures; to inhibit ice recrystallisation in biological materials or foods; for cryopreservation and hypothermic protection of cells, embryos, tissues etc. (particularly human platelets) and to kill tumour cells. (II) and (IIa) are also used to inhibit initiation and progression of diseases or spoilage caused by low temperature pathogens (particularly fungi) in plants, **frozen foods** and any cryopreserved biological material. (IV) can be used to direct protein secretion in transgenic organisms or expression systems. Also (not claimed) antibodies raised against (II) are used in (II)-specific assays and to detect related proteins in other plants, while fragments of (I) can be used similarly as hybridisation probes.

ADVANTAGE - (II) have both chitinase (antifungal) and antifreeze activities; inhibit growth of ice crystals and of ice recrystallisation, and protect liposomes, cell membranes and proteins, cells and organs at low temperature.

Dwg.0/26

L46 ANSWER 36 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
 ACCESSION NUMBER: 1999-095739 [08] WPIDS
 DOC. NO. NON-CPI: N1999-069531
 DOC. NO. CPI: C1999-028357
 TITLE: New nucleic acid encoding **antifreeze proteins** of *Tenebrio molitor* - used to improve low temperature tolerance of fish, plants etc., and quality of foods or biological materials during frozen storage.
 DERWENT CLASS: B04 C06 D12 D13 D16 P14
 INVENTOR(S): DAVIES, P L; GRAHAM, L A; LIOU, Y; WALKER, V K
 PATENT ASSIGNEE(S): (TOOH) UNIV QUEENS KINGSTON
 COUNTRY COUNT: 83
 PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|--|------|----------|-----------|----|----|
| WO 9900493 | A1 | 19990107 | (199908)* | EN | 88 |
| RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SZ UG ZW | | | | | |
| W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH GM GW HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW | | | | | |
| AU 9880970 | A | 19990119 | (199922) | | |
| EP 990032 | A1 | 20000405 | (200021) | EN | |

R: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
 JP 2002507889 W 20020312 (200220) 92
 US 6392024 B1 20020521 (200239)
 AU 747466 B 20020516 (200244)
 US 2002165383 A1 20021107 (200275)

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|------------------|--------|----------------|----------|
| WO 9900493 | A1 | WO 1998-CA618 | 19980625 |
| AU 9880970 | A | AU 1998-80970 | 19980625 |
| EP 990032 | A1 | EP 1998-930588 | 19980625 |
| | | WO 1998-CA618 | 19980625 |
| JP 2002507889 W | | WO 1998-CA618 | 19980625 |
| | | JP 1999-505174 | 19980625 |
| US 6392024 | B1 | US 1997-882907 | 19970626 |
| AU 747466 | B | AU 1998-80970 | 19980625 |
| US 2002165383 A1 | Div ex | US 1997-882907 | 19970626 |
| | | US 2002-32658 | 20020102 |

FILING DETAILS:

| PATENT NO | KIND | PATENT NO |
|-----------------|------------------------------|--------------------------|
| AU 9880970 | A Based on | WO 9900493 |
| EP 990032 | A1 Based on | WO 9900493 |
| JP 2002507889 W | Based on | WO 9900493 |
| AU 747466 | B Previous Publ. Based on | AU 9880970 WO 9900493 |

PRIORITY APPLN. INFO: US 1997-882907 19970626; US 2002-32658
 20020102

AB WO 9900493 A UPAB: 19990331

New isolated nucleic acid (I) encodes an **antifreeze protein** (II) that has (i) a molecular weight (m.w.) of 7-13 kD; (ii) thermal hysteresis activity (THA) over 1.5 deg. C at 1 mg/ml; (iii) binds specifically to antibodies raised against the Tenebrio molitor YL1-YL4 **antifreeze proteins**, is at least 60% identical with YL1-4 or has a sequence that includes at least one repeating unit of the consensus sequence CTXSXXCXXAXT (S1). Also new are: (A) isolated nucleic acid (Ia) that hybridises to a 68 bp sequence (S2) under stringent conditions; (B) isolated nucleic acid (Ib) encoding a protein having at least one repeat of a 12 contiguous amino acid (aa) motif present in T. molitor **antifreeze proteins** and binding to antibodies directed against YL1-YL4; (C) isolated protein (IIa) defined as for (II) but additionally comprising: (i) at least one repeat of (1), (ii) has pI of about 8-10 (iii) has N-terminal sequence XCTXXXCTXCTXXCT; (D) antibodies (Ab) specifically immunoreactive with an **antifreeze protein** with at least one repeat of (S1); (E) organisms that include (I), (F) method for decreasing the freezing point of an aqueous solution comprising addition of an **antifreeze protein** having greater than 1 repeat of (SI) to the aqueous solution; and (G) expression vectors containing (I) linked to a promoter.

USE - (II), optionally present in an organism, are used to improve preservation of **frozen foods** (specifically to reduce formation of ice crystals following exposure to repeated freeze-thaw cycles) or viability of biological materials (e.g. organs, cells or extracts) stored or transported at low temperature, or more generally to depress the freezing point of any aqueous solution, particularly where this is applied to an organism. (I) is used to produce transgenic animals

and plants (e.g. grapes, oilseed crops, grains, citrus fruit or sugar cane) having better tolerance to freezing. Fragments of (I) are used as probes to detect or isolate coding sequences, in diagnosis (for determining gene expression) and as inhibitors (e.g. to render pests more sensitive to cold). Ab are used to detect (II) in usual immunoassays.

ADVANTAGE - (II) from *T. molitor* have specific activity 100 times greater than that of fish **antifreeze proteins**.

Dwg.0/6

L46 ANSWER 37 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
 ACCESSION NUMBER: 1999-429496 [36] WPIDS
 CROSS REFERENCE: 1999-094410 [08]
 DOC. NO. CPI: C1999-126515
 TITLE: Detecting the presence of **antifreeze proteins** in samples.
 DERWENT CLASS: B04 C07 D16
 INVENTOR(S): CRONAN, C L; LUSK, L
 PATENT ASSIGNEE(S): (MILL-N) MILLER BREWING CO
 COUNTRY COUNT: 1
 PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|------------|------|----------|-----------|----|----|
| US 5928877 | A | 19990727 | (199936)* | | 24 |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|------------|------|-------------|-------------------------|
| US 5928877 | A | CIP of | US 1989-409217 19890919 |
| | | CIP of | US 1990-486333 19900228 |
| | | Cont of | US 1992-917216 19920720 |
| | | Div ex | US 1994-180524 19940112 |
| | | | US 1997-975166 19971120 |

PRIORITY APPLN. INFO: US 1992-917216 19920720; US 1989-409217
 19890919; US 1990-486333 19900228; US
 1994-180524 19940112; US 1997-975166 19971120

AB US 5928877 A UPAB: 19990908

NOVELTY - A method (I) for detecting the presence of functional **antifreeze proteins** (AFPs) in samples, is new.

DETAILED DESCRIPTION - A method (I) of assaying for the presence of functional AFPs in a test solution, comprising:

(i) freezing a test solution which contains sucrose, has a melting point (mp), and in which ice crystals are formed;

(ii) raising the temperature of the test solution to its mp to partially melt the ice crystals;

(iii) lowering the temperature 1 - 2 deg. C below the mp, which causes the partially melted crystals to begin to grow; and

(iv) determining the presence of functional AFPs by observing the sample for the growth of hexagonal ice crystals.

USE - (I) may be used for detecting the presence of functional AFPs in samples. AFPs (which may be isolated from fish in cold polar marine waters such as the winter flounder (*Pseudopleuronectes americanus*)) bind to, and inhibit the formation of ice crystals in water as it is frozen. They may be used to prevent ice crystal growth in a wide range of frozen products such as **ice cream** and paint. In particular they may be applied to living cells and tissues (e.g. transplant organs and yeast cultures for brewing and baking), allowing them to be frozen without the risk of ice crystal formation, which disrupts cellular

membranes and kills the cells making them useless.
Dwg.0/11

L46 ANSWER 38 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
ACCESSION NUMBER: 1998-089628 [09] WPIDS
CROSS REFERENCE: 1998-089551 [09]; 1998-089552 [09]; 1998-089627 [09];
1998-520868 [44]; 2001-203286 [51]; 2001-203287 [51];
2001-210815 [44]; 2001-210816 [44]; 2001-227110 [27]
DOC. NO. CPI: C1998-030353
TITLE: Frozen confectionery products e.g. **ice cream** - contain at one **antifreeze protein** derived from plants e.g. *Juncus squarrosus* or *Geranium*.
DERWENT CLASS: D13 D16
INVENTOR(S): BYASS, L J; DARLING, D F; DOUCHET, C J; FENN, R A;
LILLFORD, P J; MCARTHUR, A J; NEEDHAM, D; SIDEBOTTOM, C;
SMALLWOOD, K; SMALLWOOD, M F; DOUCET, C J; BYASS, J;
DARLING, F; SIDEBOTTOM, C M
PATENT ASSIGNEE(S): (UNIL) UNILEVER PLC; (UNIL) UNILEVER NV; (GOOD-N) GOOD
HUMOR-BREYERS ICE CREAM DIV CONOPCO
COUNTRY COUNT: 81
PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|--|------|----------|-----------|----|----|
| GB 2315753 | A | 19980211 | (199809)* | | 45 |
| DE 19732136 | A1 | 19980129 | (199810) | | 18 |
| FR 2751513 | A1 | 19980130 | (199812) | | 40 |
| WO 9804148 | A2 | 19980205 | (199812) | EN | 42 |
| RW: AT BE CH DE DK EA ES FI FR GB GH GR IE IT KE LS LU MC MW NL OA PT SD SE SZ UG ZW | | | | | |
| W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH HU IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZW | | | | | |
| AU 9736213 | A | 19980220 | (199828) | | |
| ZA 9706473 | A | 19990331 | (199918) | | 45 |
| TW 349953 | A | 19990111 | (199923) | | |
| SK 9900090 | A3 | 19990611 | (199930) | | |
| CZ 9900254 | A3 | 19990714 | (199933) | | |
| BR 9710589 | A | 19990817 | (199954) | | |
| DE 19732136 | C2 | 19991202 | (200001) | | |
| EP 959689 | A2 | 19991201 | (200001) | EN | |
| R: AT BE CH DE DK ES FI FR GB GR IE IT LI NL PT SE | | | | | |
| CN 1231580 | A | 19991013 | (200008) | | |
| HU 9903255 | A2 | 20000128 | (200015) | | |
| AU 719506 | B | 20000511 | (200031) | | |
| AU 2000025212 | A | 20000608 | (200035)# | | |
| US 6096867 | A | 20000801 | (200039) | | |
| MX 9900955 | A1 | 19990501 | (200056) | | |
| JP 2000515754 | W | 20001128 | (200065) | | 40 |
| AU 728138 | B | 20010104 | (200107)# | | |
| KR 2000029561 | A | 20000525 | (200110) | | |
| GB 2315753 | B | 20010613 | (200134) | | |
| IT 1293770 | B | 19990310 | (200154) | | |
| IL 128029 | A | 20010913 | (200158) | | |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
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|-----------|------|-------------|------|

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|---------------|----|------------------|----------|
| GB 2315753 | A | GB 1997-14412 | 19970708 |
| DE 19732136 | A1 | DE 1997-19732136 | 19970725 |
| FR 2751513 | A1 | FR 1997-9411 | 19970724 |
| WO 9804148 | A2 | WO 1997-EP3637 | 19970704 |
| AU 9736213 | A | AU 1997-36213 | 19970704 |
| ZA 9706473 | A | ZA 1997-6473 | 19970722 |
| TW 349953 | A | TW 1997-118913 | 19971215 |
| SK 9900090 | A3 | WO 1997-EP3637 | 19970704 |
| | | SK 1999-90 | 19970704 |
| CZ 9900254 | A3 | WO 1997-EP3637 | 19970704 |
| | | CZ 1999-254 | 19970704 |
| BR 9710589 | A | BR 1997-10589 | 19970704 |
| | | WO 1997-EP3637 | 19970704 |
| DE 19732136 | C2 | DE 1997-19732136 | 19970725 |
| EP 959689 | A2 | EP 1997-932793 | 19970704 |
| | | WO 1997-EP3637 | 19970704 |
| CN 1231580 | A | CN 1997-198219 | 19970704 |
| HU 9903255 | A2 | WO 1997-EP3637 | 19970704 |
| | | HU 1999-3255 | 19970704 |
| AU 719506 | B | AU 1997-36213 | 19970704 |
| AU 2000025212 | A | AU 2000-25212 | 20000331 |
| US 6096867 | A | US 1997-898351 | 19970722 |
| MX 9900955 | A1 | MX 1999-955 | 19990126 |
| JP 2000515754 | W | WO 1997-EP3637 | 19970704 |
| | | JP 1998-508420 | 19970704 |
| AU 728138 | B | AU 2000-25212 | 20000331 |
| KR 2000029561 | A | WO 1997-EP3637 | 19970704 |
| | | KR 1999-700619 | 19990125 |
| GB 2315753 | B | GB 1997-14412 | 19970708 |
| IT 1293770 | B | IT 1997-MI1755 | 19970723 |
| IL 128029 | A | IL 1997-128029 | 19970704 |

FILING DETAILS:

| PATENT NO | KIND | | PATENT NO |
|---------------|------|----------------|---------------|
| AU 9736213 | A | Based on | WO 9804148 |
| CZ 9900254 | A3 | Based on | WO 9804148 |
| BR 9710589 | A | Based on | WO 9804148 |
| EP 959689 | A2 | Based on | WO 9804148 |
| HU 9903255 | A2 | Based on | WO 9804148 |
| AU 719506 | B | Previous Publ. | AU 9736213 |
| | | Based on | WO 9804148 |
| AU 2000025212 | A | Div ex | AU 719506 |
| JP 2000515754 | W | Based on | WO 9804148 |
| AU 728138 | B | Previous Publ. | AU 2000025212 |
| | | Div ex | AU 719506 |
| KR 2000029561 | A | Based on | WO 9804148 |
| IL 128029 | A | Based on | WO 9804148 |

PRIORITY APPLN. INFO: EP 1997-301733 19970314; EP 1996-305497
 19960726; EP 1996-305499 19960726; EP
 1996-308362 19961119; EP 1997-301719
 19970314; AU 2000-25212 20000331

AB GB 2315753 A UPAB: 20020213

Frozen confectionery products containing one or more **antifreeze proteins** (AFPs) derived from plants where the AFPs in an aqueous composition have an ice crystal size of less than 15 μ m after quick freezing to -40 deg. C or less, followed by storage for one hour at -6 deg. C.

USE - The AFPs improve the freezing tolerance of frozen products by

inhibiting the recrystallisation of ice, and controlling ice crystal shape. They also improve the textural properties of frozen products like **ice cream**.

Dwg.0/0

L46 ANSWER 39 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
 ACCESSION NUMBER: 1998-089627 [09] WPIDS
 CROSS REFERENCE: 1998-089551 [09]; 1998-089552 [09]; 1998-089628 [09];
 1998-520868 [44]; 2001-203286 [21]; 2001-203287 [21];
 2001-210815 [21]; 2001-210816 [21]; 2001-227110 [24]
 C1998-030352
 DOC. NO. CPI:
 TITLE: **Anti-freeze proteins** for
 use in **frozen** confectionery **food**
 products - have heat thermal stability shown by no
 significant reduction in ice-recrystallisation inhibition
 properties after specific heat treatments.
 DERWENT CLASS: D13 D16
 INVENTOR(S): MCARTHUR, A J; SIDEBOTTOM, C M; LILLFORD, P J; WILDING,
 P; SIDEBOTTOM, C
 PATENT ASSIGNEE(S): (UNIL) UNILEVER PLC; (UNIL) UNILEVER NV; (GOOD-N) GOOD
 HUMOR-BREYERS ICE CREAMS; (GOOD-N) GOOD HUMOR-BREYERS ICE
 CREAM DIV CONOPCO
 COUNTRY COUNT: 80
 PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|--|------|----------|-----------|----|----|
| GB 2315752 | A | 19980211 | (199809)* | | 33 |
| FR 2751657 | A1 | 19980130 | (199812) | | 29 |
| WO 9804699 | A1 | 19980205 | (199812) | EN | 33 |
| RW: AT BE CH DE DK EA ES FI FR GB GH GR IE IT KE LS LU MC MW NL OA PT SD SE SZ UG ZW | | | | | |
| W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH HU IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZW | | | | | |
| DE 19732135 | A1 | 19980226 | (199814) | | 11 |
| AU 9734437 | A | 19980220 | (199828) | | |
| DE 19732135 | C2 | 19980723 | (199833) | | |
| EP 918863 | A1 | 19990602 | (199926) | EN | |
| R: AT BE CH DE DK ES FI FR GB GR IE IT LI NL PT SE | | | | | |
| CZ 9900252 | A3 | 19990714 | (199933) | | |
| SK 9900089 | A3 | 19990712 | (199939) | | |
| CN 1226284 | A | 19990818 | (199951) | | |
| BR 9710564 | A | 19990817 | (199954) | | |
| HU 9903164 | A2 | 20000128 | (200015) | | |
| US 6090917 | A | 20000718 | (200037) | | |
| JP 2000515751 | W | 20001128 | (200065) | | 29 |
| US 6156880 | A | 20001205 | (200066) | | |
| US 6162789 | A | 20001219 | (200102) | | |
| AU 726699 | B | 20001116 | (200103) | | |
| KR 2000029554 | A | 20000525 | (200110) | | |
| MX 9900952 | A1 | 20000101 | (200115) | | |
| GB 2315752 | B | 20010613 | (200134) | | |
| ZA 9706477 | A | 19990331 | (200134) | | 33 |
| IT 1293767 | B | 19990310 | (200154) | | |
| SK 282279 | B6 | 20020107 | (200213) | | |
| DE 69722219 | E | 20030626 | (200350) | | |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|---------------|----------|------------------|----------|
| GB 2315752 | A | GB 1997-14411 | 19970708 |
| FR 2751657 | A1 | FR 1997-9410 | 19970724 |
| WO 9804699 | A1 | WO 1997-EP3634 | 19970704 |
| DE 19732135 | A1 | DE 1997-19732135 | 19970725 |
| AU 9734437 | A | AU 1997-34437 | 19970704 |
| DE 19732135 | C2 | DE 1997-19732135 | 19970725 |
| EP 918863 | A1 | EP 1997-930515 | 19970704 |
| | | WO 1997-EP3634 | 19970704 |
| CZ 9900252 | A3 | WO 1997-EP3634 | 19970704 |
| | | CZ 1999-252 | 19970704 |
| SK 9900089 | A3 | WO 1997-EP3634 | 19970704 |
| | | SK 1999-89 | 19970704 |
| CN 1226284 | A | CN 1997-196682 | 19970704 |
| BR 9710564 | A | BR 1997-10564 | 19970704 |
| | | WO 1997-EP3634 | 19970704 |
| HU 9903164 | A2 | WO 1997-EP3634 | 19970704 |
| | | HU 1999-3164 | 19970704 |
| US 6090917 | A | US 1997-890489 | 19970709 |
| JP 2000515751 | W | WO 1997-EP3634 | 19970704 |
| | | JP 1998-508417 | 19970704 |
| US 6156880 | A Div ex | US 1997-890489 | 19970709 |
| | | US 1999-385930 | 19990830 |
| US 6162789 | A Div ex | US 1997-890489 | 19970709 |
| | | US 1999-385135 | 19990830 |
| AU 726699 | B | AU 1997-34437 | 19970704 |
| KR 2000029554 | A | WO 1997-EP3634 | 19970704 |
| | | KR 1999-700612 | 19990125 |
| MX 9900952 | A1 | MX 1999-952 | 19990126 |
| GB 2315752 | B | GB 1997-14411 | 19970708 |
| ZA 9706477 | A | ZA 1997-6477 | 19970722 |
| IT 1293767 | B | IT 1997-MI1752 | 19970723 |
| SK 282279 | B6 | WO 1997-EP3634 | 19970704 |
| | | SK 1999-89 | 19970704 |
| DE 69722219 | E | DE 1997-622219 | 19970704 |
| | | EP 1997-932792 | 19970704 |
| | | WO 1997-EP3636 | 19970704 |

FILING DETAILS:

| PATENT NO | KIND | PATENT NO |
|---------------|-------------------|------------|
| AU 9734437 | A Based on | WO 9804699 |
| EP 918863 | A1 Based on | WO 9804699 |
| CZ 9900252 | A3 Based on | WO 9804699 |
| BR 9710564 | A Based on | WO 9804699 |
| HU 9903164 | A2 Based on | WO 9804699 |
| JP 2000515751 | W Based on | WO 9804699 |
| US 6156880 | A Div ex | US 6090917 |
| US 6162789 | A Div ex | US 6090917 |
| AU 726699 | B Previous Publ. | AU 9734437 |
| | Based on | WO 9804699 |
| KR 2000029554 | A Based on | WO 9804699 |
| SK 282279 | B6 Previous Publ. | SK 9900089 |
| | Based on | WO 9804699 |
| DE 69722219 | E Based on | EP 923306 |
| | Based on | WO 9804147 |

PRIORITY APPLN. INFO: EP 1996-305497 19960726; EP 1996-305499
19960726

AB GB 2315752 A UPAB: 20030805

Anti-freeze proteins (AFP's), having a thermal stability evidenced by no significant reduction in ice-recrystallisation inhibition properties after heat-treatment for 1 hour at 60 deg. C, one hour at 80 deg. C or 10 minutes at 100 deg. C, are new. Also claimed are: (i) a vector capable of encoding at least one APF; (ii) a transformed organism capable of expressing at least one APF; (iii) a frozen confectionery product comprising 0.0001-0.5 wt. % APF; and (iv) a pre-mix suitable for use in the production of a frozen confectionery product comprising AFP.

USE - The AFP's can be used in food products, especially in food products which are heated by e.g. sterilisation or pasteurisation prior to freezing. These include milk containing frozen confections, such as **ice-cream**, frozen yoghurt, sherbet, sorbet, ice-milk and frozen custard, water-ices, granitas and frozen fruit purees.

ADVANTAGE - The AFP's improve the freezing tolerance of foodstuffs, and do not destabilise during processing, especially during pasteurisation.
Dwg.0/0

L46 ANSWER 40 OF 40 WPIDS COPYRIGHT 2003 THOMSON DERWENT on STN
ACCESSION NUMBER: 1997-449643 [42] WPIDS
DOC. NO. CPI: C1997-143568
TITLE: Highly active **vegetable anti-freeze protein**.
DERWENT CLASS: A97 C06
INVENTOR(S): FEI, Y; HUANG, T; SUN, L
PATENT ASSIGNEE(S): (DEVE-N) INST DEVELOPMENTAL BIOLOGY CHINESE ACAD
COUNTRY COUNT: 1
PATENT INFORMATION:

| PATENT NO | KIND | DATE | WEEK | LA | PG |
|------------|------|----------|-----------|----|----|
| CN 1117497 | A | 19960228 | (199742)* | | |

APPLICATION DETAILS:

| PATENT NO | KIND | APPLICATION | DATE |
|------------|------|----------------|----------|
| CN 1117497 | A | CN 1994-115012 | 19940824 |

PRIORITY APPLN. INFO: CN 1994-115012 19940824

AB CN 1117497 A UPAB: 19971021

Anti-freeze protein is separated from the anticold plant by homogenising, setting with ammonium and separating with DE-52 ion column and Sephadex G 100. Its melting point in concentration 30 mg/ml is -10 to -14 deg. C. Under perfusion, layer separation of the higher active **anti-freeze protein** can be obtained.

The polygon spatial crystal structure can be observed with a phase contrast microscope at low temperatures, the molecular weight range being 94-13 kDa, as determined by SDS polyacrylamide gel electrophoresis and silver staining. The process involves homogenising, subjecting to centrifugation and ultrafiltration, removing salt, setting in an ion column, followed by gradient elution, molecular sieving, concentration and cold-drying.

=> file home

FILE 'HOME' ENTERED AT 15:49:17 ON 21 SEP 2003